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The Journal of the American Medical Association

VOL. XIX. CHICAGO, DECEMBER 3, 1892. No. 23.

ORIGINAL ARTICLES.

THE U. S. ARMY RATION AND MILITARY FOOD.

Read in the Section of Physiology and Dietetics at the Forty-third Annual Meeting of the American Medical Association, held at Detroit, Mich., June, 1892.

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Col. Jos. R. Smith, Surgeon U. S. Army, read before the Ninth International Medical Congress, a paper on "The best Ration for the Soldier," in which he very carefully analyzed the ration then existing, compared it with the rations of foreign armies and the dietaries of various laborers, and discussed various other points. To go into this matter again would be threshing out old straw, and the present paper therefore is confined to a description and discussion of the present ration which has been somewhat modified in form and considerably modified as to its management since the time at which the former paper was written.

An army is a collection of disciplined, active, healthy men in the prime of life, to be used as a fighting force in the service of the nation, and it is the object of military administration to so govern and train these men that they shall not fail when fighters are needed. Everything is to be done which can reasonably be expected to increase their efficiency, and it is an actual fact that nearly every military law and regulation has for its ultimate effect the increased efficiency of the individual soldier as a fighter. Unless the man is kept in health, he is useless, and for this reason all subjects which relate to his health are given much thought. Clothing, food, shelter and exercise are the principal subjects for consideration for if any of them are improper, there is sure to be a loss of efficiency, but it is probable that deficiencies of food or improper food will cause damage or disaster more quickly than anything else. For instance, most of the diseases of the war of 1812 were due to defective food, and in ninety per cent. of the cases the flour was at fault. In the war of the rebellion similar reports were often received, and the tales of actual hunger that all veterans recount, are too numerous by far. It is evident, therefore, that the ration should be the subject of most careful thought, and all reasonable means be tried to adjust it to the exigencies of military life.

A "ration" is the technical term for the sum total of the daily allowances of food issued to the soldier in accordance with law. Its present constituents are given in full in tabular form below.

The candles and soap are considered a part of a ration, though not food.

MANAGEMENT OF RATION.

It must not be thought that the soldier is restricted to the actual articles that are mentioned in the table, for by a fairly efficient system, the company commander is permitted to make outside purchases of food. If there is any excess of food uncooked which will not be used by the company, he sells back to the commissary the excess, technically called the "savings," and with the proceeds buys what he thinks proper. These savings are a very important matter, and amount in the aggregate to a fair sum per company, although per man they may average but from 1 to 4 cents per day. This fund is still further augmented by the receipts from the Post Exchange; this institution is a general store for the sale to soldiers of small articles he may need, such as stationery, tobacco, lunches, beer, etc., the prices being a slight increase over the cost, and the net profits being turned into the company funds—in other words, a coöperative retail store which makes each soldier a silent partner, though not subject to any losses.

TABLE I.—U. S. ARMY RATION.

Component.	One Article of Each List.	
Meat	12 oz. pork 12 oz. bacon 22 oz. salt beef 20 oz. fresh beef 20 oz. mutton 14 oz. dried fish 18 oz. pickled fish 18 oz. fresh fish	In 10 days it is usual to give 7 days' of fresh beef, 2 of bacon and 1 of salt pork. The other articles are very seldom issued.
Bread	18 oz. flour 18 oz. soft bread 16 oz. hard bread 20 oz. corn meal.	Soft bread is the invariable issue in garrison.
Dried Vegetables	2 2-5 oz. beans or peas. 1 3-5 oz. rice or hominy.	
Fresh Vegetables	1 lb. potatoes or 9-10 potatoes and 1-10 onions or 8-10 potatoes and 2-10 onions or 7-10 potatoes and 3-10 canned tomatoes 7-10 potatoes and 3-10 vegetables, such as cabbage, beets, carrots, turnips, squash, etc.	
Coffee	1 3-5 oz. green coffee. 1 7-25 oz. roasted coffee. 8-25 oz. tea.	
Sugar	2 2-5 oz. sugar. 16-25 gill molasses or syrup.	
Condiments and additional articles	8-25 gill vinegar. 16-25 oz. salt. 1-25 oz. pepper. 6-25 oz. candles. [In the field.] 16-25 oz. soap.	

During the first three months of 1892, the average daily receipts and expenditures per man at Fort Assinniboine, Montana, were as follows:

From ration	2.72 cents.
From exchange	2.58 cents.
From other sources	.34 cents.
Total receipts	5.64 cents.
Expenditures for extra food	4.11 cents.

It will be noticed that the profits from the Post Exchange enabled the daily average expenditures for food to exceed the savings from the ration by 1.39 cents per man. These figures are the averages of

nine companies and troops, each having about fifty men.

It is forbidden company commanders to use the savings from the ration except for the benefit of the soldier's table fare, so that there shall be no cheeseparing of the ration in order to save money for other purposes. Very recently part of the savings of the ration was turned into post, band, regimental funds, and what not, and the money used for objects from which the soldier derived no food benefit whatever. It is a curious thing that when in 1864 it was discovered that the soldier could not eat all of his ration, which had been increased in 1861, and that the savings went into post and regimental funds, it apparently did not occur to anyone to abolish these funds, but instead it was deemed wise to reduce the ration to what it had been previous to 1861, notwithstanding the fact that the soldier was often underfed. It was over 25 years before this setback was remedied. At present then, if, owing to climate or other causes, the soldier does not want all of the food to which he is entitled, the money savings must either accumulate in large amounts or be used for the purchase of those little extras, which, added to the bare needs of existence, make life much more worth living. In addition it must be said that large company funds are, as a rule, frowned upon, and, other things being equal, the officer who allows the money to accumulate instead of spending it judiciously for the benefit of his men is not considered to be doing the best. As a general rule it may be safe to say that when a company is so situated as to be liable to be called suddenly into the field, its commander considers it wise to accumulate and keep on hand a certain fund of from $200 to $500 for the purchase of extras in the field whenever practicable, for to be compelled to subsist on the plain ration is looked upon as a misfortune. To keep on hand a fund of one to two thousand dollars is not considered wise management.

In drawing beef at the larger posts, the contractor usually supplies a fore quarter and a hind quarter alternately. At those posts on the frontier where forage is very scarce, the beef is necessarily somewhat tougher than it would be if the cattle could be properly fed before killing. The allowance (1¼ pounds) is gross weight, the actual amount of meat is much less.

It rests with the Department Commander usually as to how much of each kind of article the soldier shall have when the law allows a choice. It is perhaps usual to order that in ten days there shall be seven issues of beef, two of bacon and one of pork, but if the soldier can with the help of outside purchases, manage to subsist for ten days on the beef allowed for seven days, he saves the money value of one day's pork ration and two of bacon. It might be added that "savings" of fresh beef and fresh vegetables are not permitted, the company being compelled to draw all their allowance, though this regulation does not forbid them to sell privately any they have drawn and which will not be used, but become spoiled by decay.

The management of the flour is taken out of the hands of the company commanders entirely and all flour turned into the post bakery, where all the bread used by the men is baked. The ration of flour is 18 oz., and the soldier is entitled to either that or 18 oz. soft bread, but as that amount of bread can be made from about 10 to 14 oz. flour, there is a large saving of flour, which is sold and after deducting expenses of the bakery, the surplus is returned to the company. Flour needed in the companies for puddings, griddle cakes, and the like, must be purchased from the company fund. There is usually a good baker among the soldiers at each post or several men who have an aptitude for that trade and who easily learn. These men are detailed for the bakery work and receive extra pay. With but rare exceptions the bread supplied to the soldier is excellent.

By means of the above system of management, a company fund is kept from which the extra diet on holidays can be purchased when there is a convenient market, as for instance turkey on Thanksgiving and Christmas, eggs on Easter and so on. At all other times the fund is constantly drawn upon for the purchase of extras. This fund is considered of the highest importance, and new restrictions are being constantly thrown around it to prevent savings from the ration being diverted to other purposes than for the increased efficiency of the soldier's table. The existence of a good fund for the purchase of extras, has always been taken for granted. An army cook book is issued to troops, and it is full of useful and excellent recipes, but 75 per cent. of them call for articles not supplied in the ration, such as butter, lard, eggs, flavoring and seasoning, and the unfortunate company that is minus a company fund can find no use whatever for over half of these recipes.

The ration is designed for healthy men, and admits of no flexibility to suit the sick. For the latter who might die if forced to subsist on the harsh components of the ration, another arrangement is made. The ration of the sick, or its money value, is given to the surgeon who buys the extra diet that is needed, which purchases are further increased by such articles as beef extracts, condensed milk, etc., supplied by the Medical Department for the use of the sick only.

SELECTION OF RATION.

An army must often be fed at a great distance from the market, and it is therefore evident that the chief objects in view in the selection of the soldier's food must be facility of transportation and ease of preservation in all climates. Articles that are bulky or easily damaged by rough handling, and those that are not easily preserved from decay are at once ruled out. It need scarcely be mentioned that the articles must be produced in abundance throughout the country, neither imported nor the particular preparations of a few manufacturers. Couple with this, the fact that the articles must be so inexpensive as to refute any charges of extravagance and it will be readily understood that with a few exceptions, the the ration contains about all the articles that it is possible to put in it at present without calling on foods that are preserved, canned or otherwise specially prepared. In regard to charges of extravagance it may be remarked in passing, that as the present ration usually costs less than 15 cents it is rather far fetched to talk of extravagance. There are few healthy laborers in respectable standing in civil life who subsist on less than one dollar a week.

For these reasons, the soldier's ration has always been simple and dry. Indeed, until quite recently, there has been but little change in the ration for 75 years. For instance, omitting details, during the

revolution, the soldier's food was essentially: 1 pound beef, 1 pound bread, 1 pint milk, 1 quart beer, and a taste of molasses and dried vegetables, though practically he received but a small fraction of his allowance. In 1785, after the war, it was even simpler, 1 pound beef, 1 pound bread, and 1 gill of rum. The beef was increased to 1¼ pound in 1798, and the bread or flour to 18 oz. at the same time, at which they have since remained except for three years during the rebellion when the bread or flour was increased by four ounces. At this time also (1861–1864) 1 pound potatoes was issued three times a week. From time to time other changes and slight additions were made; in 1818 some dried vegetables (peas, etc.,) were added; in 1832 a small amount of coffee and sugar was issued in lieu of spirits, and there have been numerous changes in salt, pepper and vinegar. The coffee and sugar have remained unaltered for 32 years. At the present time the ration is more liberal than it has ever been before.

Human beings can by degrees become accustomed to any diet, even though it be outrageous; they can subsist chiefly on fruits in the tropics or chiefly on fats in the arctic regions, but any rapid change of diet is disastrous. Now, as the militia when mustered into the service of the United States must subsist on the army ration, it is a cardinal principle that the food supplied must closely approximate that to which they are accustomed. As regards the present ration this is approximately so, but it has not always been the case. The Secretary of War (Mr. Calhoun) in 1818 reported to Congress that the mortality during the wars of the revolution and 1812 from the change of a plentiful mode of living to that of the camp, "was probably greater than from the sword." As Americans live more liberally than Europeans in similar walks of life, we have at once an incontrovertible reason why the U. S. ration should be more liberal than that of any European army. The American laborer has meat every day, while the European laborer may have it but once a week, and the American soldier must and does have meat three times a day.

There is another point to which a mere reference is necessary. In cold climates no article can be used in the field in winter, that would be spoiled by freezing, or by alternate freezing and thawing. This blocks out a few articles put up in cans in fluid preservative, potatoes and all fresh vegetables, and fruits and various other articles.

Until quite recently (within 50 years), it was presumed that if the ration kept the soldier alive it was sufficient. The idea that it should keep him in health is modern, and logically follows both from increased knowledge of the etiology of faulty food in the production of disease, and from a contemplation of disastrous epidemics on land and sea, following upon a long continued improper food. The smallest amount of food that will keep a man alive has been approximately known for centuries, and though modern experiments make our knowledge vastly more detailed, accurate, and scientific, they have added little to the knowledge that one pound of bread and 1¼ meat daily will subsist a man for quite a long period. When we come to discuss the amount and kind of food necessary to keep him in health we are on debatable ground. Our knowledge on this subject is not yet complete enough, we have only theories and opinions. A man may appear to be healthy, but it is not quite certain that he may, on the one hand be taking too much of one variety of food, generating a tendency to plethora or lithæmia, or on the other hand living in a constant tendency to anæmia or scrobutus, with all the liability to contract other diseases from lessened general vitality and resisting powers. We all know men whose usual daily food is even more simple than the ration, but we know also that there are times, as during occasional visits from home, when they eat other things that perhaps restore the balance. Patients have often been restored to health by a change of diet made necessary by a recommended change of scene.

VARIETY.

The soldier is occasionally so situated for prolonged periods that he leads an essentially sedentary life, and the total amount of food energy needed is far less than what is supplied. It is in such circumstances that there must be more variety than the ration affords. When he works hard he can subsist on an unvaried diet and feel well, but if he lives in enforced idleness, the poorer menu seen in table 12 would soon cause satiety. Practically and usually, variety is secured by purchase or gardens, but occasionally it cannot be so secured. The gardens at military posts are considered of great value and fostered with as much care as possible. Seeds and implements are furnished to a certain extent, suitable ground reserved for the purpose, and men detailed for the work and excused from other duties. There is a feeling that the soldier should not be compelled to raise his own vegetables. The company is liable, in some places, to be called into the field and the garden neglected to its ruin, and the daily military routine with its exactions and privations is liable to discourage in the soldier such continuous labor as is the lot of farmers. Practically it is found that there are several men in each company who have been raised as farmers, and who are anxious to do the work.

The diet can be greatly improved by the addition of soups, providing the cook is efficient. Bones are too often thrown away, and though they cannot supply much nutriment, as explained on page 659, yet soups may be made the vehicle for the nutriment of rice, beans, tomatoes and other vegetables. Those companies blessed with good, economical, and energetic cooks usually have soups quite frequently, and the extra comfort thereby gained more than compensates for the trouble.

In regard to the variety of the ration, the thought is now being evolved that it is no more necessary to have a ration that will keep in all climates, than it is to have a uniform that can be worn in all climates, whether 50 below zero, or 130 above. As the food can be purchased within the climatic district in which it is used, the ration in the extreme north can be of such a nature that it might spoil in the extreme south or *vice versa*. If such a radical idea ever becomes practicable it will greatly facilitate the process of making the ration flexible. A few years ago it was thought that the soldier of the southern summer must eat the same kind of fat pork, etc., that was used in the northern winter, but at present it is recognized that there must be a distinction, and as time goes on there is a greater and greater tendency shown to adapt the food to the place and circumstances. The addition to the ration of fresh vegeta-

bles in 1890, has been one of the greatest advances made since 1818, when dried vegetables were added in lieu of some of the old issues, and various other substitutions permitted. The occasional issue of dried or fresh fruits of the cheaper and more easily preserved varieties would be a boon highly appreciated by the troops in the hot districts of the south.

If two ships were to start from New York, each to be absent several years, one in the Arctic regions and the other in the tropics, no one would even dream of provisioning them alike. Yet if two armies were similarly to start from New York for long periods, one to the extreme north, and the other to the hottest parts of the south, the law presumes that both shall carry essentially the *same* rations. We have not yet reached the point where it is decidedly recognized that the variety in the ration must be great enough to permit of sufficient flexibility to suit extremes of climate.

As all armies in the world have been fed on the same general principles, there is scarcely any doubt that the dryness and the sameness of the food is a great factor in the production of the tendency to drunkenness, proverbial among soldiers and sailors. Drunkenness can never be eradicated from an army. The class of men from whom the soldiers are recruited are not tee-totalers, but it is safe to say that there has been a phenomenal decrease in the amount of drunkenness in recent years, and it may be justifiable to predict a still further decrease as the food becomes more varied. The writer once canvassed the men at a small post, Fort Gaston, California, and found that there was a large per cent: of total abstainers, and at that time, he was certain that it was a larger percentage than among mechanics and laborers in civil life; but the post was most favorably situated, was blessed with an enormous garden for vegetables, there was a profusion of fruit in season, and game could be obtained throughout the year. As elsewhere mentioned, the sameness of diet of German soldiers during the Franco-Prussian war when Ebswurst was used, was compensated for by the large stores of wine found in the vicinity of Paris, and by the occasional issue of brandy, a still further proof of the tendency to drink alcoholic beverages when food is scanty and unvaried.

It is probably true that at posts in cold climates in winter when there is much idleness, and the diet is not varied, the soldiers suffer more from chronic constipation than an equal number of healthy civilians. It would be impossible to substantiate such a statement because reference is made to those slight cases which never appear on the sick report, but who try to treat themselves with patent medicines. If it is true generally, it is due in part at least to the sameness of diet and the absence of fresh fruits and vegetables. Since the addition of potatoes all the year, and of fresh vegetables in summer, there may have been an improvement, but how much, if any, is not known.

The enormous number of cases of rheumatism occurring during the rebellion and since the rebellion in veterans may not be entirely due to the exposures, as popularly supposed. These men were hardened to exposure and should not have had more rheumatism than hunters, trappers, and the aboriginal Indians. The limited, often insufficient, ration and the absence of fresh articles may have been one of the factors at work. Indeed, new facts are being continually brought forward, showing new relations between a disease and the habitual diet of a patient. Diet also in its relation to diseased states, is becoming an all important item of therapeutics. It may be justifiable therefore to express a doubt as to whether in the long run, the bare, unadorned unvaried ration as issued, will tend towards the production of perfect health and the greatest efficiency, if eaten to the exclusion of everything else.

COOKING.

Every soldier is supposed to be able to cook his own ration. He can no more do it than can every mechanic go into his own kitchen and prepare his own meals. Cooking is a fine art and cannot be learned, though some of its technique can be taught. There must be aptitude. Officers of experience state that unless the soldier shows much aptitude as a cook it is useless to try to teach him. In every company there is usually one man who is fairly expert, and he is detailed as company cook and excused from other duties. It is almost needless to remark that he is a most important adjunct of the military organization. It has been said that the cook is the real manager of a company, and as he is good or bad, so is the company good or bad. The writer once served at a post where one company, blessed with a born cook among its soldiers, lived in a state as nearly approaching luxury as could be desired, while another organization with exactly the same ration, but having a thorough-bred idiot for a cook, lived on miserable fare and were discontented and thoroughly unhappy. Indeed, if the soldier's ration were as good and varied as the country affords, it could be ruined by some of the men who preside over the army cooking. This matter has become so important, that it is now recommended on all sides that a special cook be enlisted for each organization as is the case in the navy. It may be said that the soldier is occasionally absent from his company and in that case should be able to cook his own ration, but in that case, he cannot carry utensils, and he is furnished with a special cooked ration to be described, and in addition the uncooked ration is supplied to the company only when cooking is practicable.

Though the frying pan is a recognized evil in civil life, wastes food by making much of it indigestible, causes dyspepsia and untold evils, and is a general all around nuisance to physicians, yet it is well nigh impossible to do without it in the army, particularly in the field. A trapper or frontiersman will cling to his frying pan as his dearest friend, and the soldier's fire indeed admits of only the simplest kind of cooking—frying and boiling. The evil in the field is not so great as would be supposed, for it is well known that outdoor life certainly increases the digestive powers to a most wonderful extent. The writer once knew an officer who was a confirmed, pessimistic dyspeptic, whose diet had to be almost as carefully selected as a child's, and whose illness was probably due to lack of exercise, for when he took the field and was compelled to do fatiguing work, he ate large quantities of fried food, dripping in grease, and not only was he comfortable, but he grew fat and was actually cheerful. In the garrison diet lists of tables 12 and 13 it will be noticed that there are very few fried articles.

At certain large posts an innovation in the way of a general mess is now in practical operation, the

cooking is all done in a central kitchen and the men all partake of the same fare. This change is being tried in the interest of economy and efficiency, it being supposed that there is less waste and better cooking. It is possibly too soon to give a definite opinion as to the value of the general mess in the army. For field service, particularly in the western country, where a company is so often on duty detached from its regiment, the company mess will probably prevail, because the utensils must be kept on hand, and the system must be constantly practised in order to be efficient, and in addition it is not practicable with camp fires, and portable ovens to cook for very large numbers in temporary camps or on the march.

Very closely connected with cooking is the proper serving of food. When soldiers are in the field, each one must look after his own affairs and take care of his own tin plate and cup, iron knife, fork and spoon, and nothing breakable is carried. Everyone who has been camping knows how difficult it is to take along many appliances, and how makeshifts must be used when serving food. In garrison there has been a decided change in recent years. Each company formerly bought its own dining outfit which was very elaborate in some cases, but quite poor in others; at present all are supplied by the Quartermaster's Department with very fair utensils, plain white dishes, silverplated knives, forks, and spoons, etc. These utensils make the table look very well, and as scrupulous cleanliness is invariably the rule, the appearance of the soldier's dining room in general is conducive to good appetites. This great attention given to the dining room and serving of food has a very decided elevating effect upon men. In civil life unusual brutality in men is not infrequently accompanied by the grossest table manners, and each is cause and each is effect, reacting upon one another. Compel a man to observe decency at table, supplying him with a neat, clean and orderly outfit, and the elevating effect is sure to come. Military men of the last century believed that to keep a soldier up to a proper discipline he should be clothed roughly, given the simplest kind of overcrowded barracks, and fed like a hog, every modern improvement being considered enervating. Could any of these dead officers see the dining rooms of some of our soldier barracks, they would surely think that the service was going to the dogs. It has been elsewhere remarked that when hardships slowly reduce vitality, the man is made less able to exist under more privation in the field. When there are no luxuries and everything has to be plain in order to be durable and serviceable, it is utter nonsense to talk of the enervating effects of luxuries. The present policy of improving the soldier's table service certainly improves the ration on principals known to every physiologist. The companies where the table is still bad are becoming the exceptions to the rule.

GARRISON RATION.

In calculating the food value of the soldier's garrison ration it has usually been the custom to take the articles mentioned in the regulations. This ignores the food from outside purchases, often considerable, and does not show what the soldier actually eats. The writer has been at considerable pains to find out exactly how much the soldiers ate at Fort Assinniboine, Montana, during the ten days from March 11 to 20, 1892. There were supplied to each company, blank forms on which were entered the itemized amounts of food on hand at the beginning, received during the ten days, and on hand at the end, from which was calculated the amount eaten, due allowance having been made for waste which was also carefully measured. The results of these experiments are detailed in tabular form below. These figures are accurate within moderately small limits for the weighings were carefully done under the direction of the company commanders, and wherever it has been possible to verify the results by other determinations they agree. The results are of considerable interest because it is the first time this work has been done since the ration was increased by the addition of vegetables, since it has been forbidden company commanders to use the saving of the ration for other purposes than for the table, and since the fund for extras has been so largely increased by the profits of the Post Exchange. When it is considered that at this isolated post, outside purchases are limited, that the Exchange is scarcely yet in full swing and that the garden-truck had been already consumed, it can be readily imagined that under more favorable conditions the variety of food might be far better and that the amounts of alimentary principles somewhat different, perhaps larger.

TABLE II.—PERCENTAGE COMPOSITION OF EDIBLE PORTIONS GARRISON RATION.

	Water.	Protein.	Fats.	Carbo-Hydrates.	Salts.	Energy, calories per lb.	Authority.
Bacon, fat	20.0	8.00	69.5	. . .	2.5	3080	Estimated fr. L. tables
Beans	12.6	23.10	2.0	59.2	3.1	1615	Atwater.
Pork, salt and fat.	12.1	.90	82.8	. . .	4.2	3510	"
Sugar, gr	2.0	. . .	. . .	97.8	.2	1820	"
Sugar, brown issue	3.0	. . .	. . .	96.5	.5	1795	Estimated fr'm L. & A.
Flour	12.5	11.00	1.0	74.9	.5	1644	Atwater.
Beef	55.0	17.10	27.0	. . .	.9	1460	"
Potatoes	78.9	2.10	.1	17.9	1.0	375	"
Onions	87.6	1.4	.3	10.1	.6	225	"
Oatmeal	7.6	15.10	7.1	68.2	2.0	1850	"
Cornmeal	15.0	9.20	3.8	70.6	1.4	1645	"
Canned apples	83.2	.20	.4	15.9	.3	315	" (fresh apples)
Dried apples	25.0	.90	1.8	71.5	1.4	1818	Estimated from A.
Tapioca or corn starch	2.0	. . .	. . .	97.8	.2	1820	Atwater.
Butter	10.5	1.00	85.0	.5	3.0	3615	"
Syrup	43.7	. . .	. . .	55.0	2.3	1023	Estimated from A.
Lard	12.0	.60	83.4	. . .	4.0	3570	" " "
Rice	12.4	7.4	.4	79.4	.4	1630	Atwater.
Canned corn	81.3	2.80	1.1	13.2	.6	345	" (green corn).
" tomatoes	90.0	.80	.4	2.5	.3	80	" (fresh tomatoes).
Macaroni and vermicelli	13.1	9.00	.3	76.8	.8	1406	Koenig.
Milk, fresh	14.1	.843	.802	1.069	.164	418	Letheby — ounces per pint of milk.
" condensed	25.0	17.00	11.0	44.00	3.0	1595	Pavy.
Peas	12.3	26.70	1.7	56.40	2.9	1565	Atwater.
Raisins	40.0	.40	. . .	54.00	.6	440	Estimated from L.
Cheese	35.0	35.00	22.0	5.00	5.0	1600	Atwater (average).
Prunes	30.0	2.50	. . .	12.0	.6	140	Approx. estimate from Fresenius.
Cabbage	92.0	2.10	.6	5.5	1.1	155	Atwater.
Ham	41.5	16.7	39.1	. . .	2.7	1960	"
Apricots, canned	50.0	2.00	. . .	30.0	.6	460	Estimated from Fresenius.
Barley	. . .	13.00	2.7	76.0	3.0	1890	Letheby.
Chocolate	12.0	20.00	50.0	10.0	4.0	2650	Payen.
Sausage	41.2	13.80	42.8	. . .	2.2	2065	Atwater.
Oysters	87.1	6.00	1.2	3.7	2.0	230	"
Salmon, canned	63.6	21.60	13.4	. . .	1.4	965	" (fresh salmon)
Crabs	. . .	15.0	1.0	. . .	. . .	326	Pavy.
Crackers	. . .	10.3	9.4	70.5	. . .	1900	Estimated from A.

L.—Letheby. A.—Atwater.

In table 2 there is stated merely for reference the percentage composition of the various articles consumed. Some of these values assumed for the articles are probably different from those used in making the experiments whose results are taken as a guide. In all cases there was an authoritative estimate on which to base the assumed values. As the

percentages are averages, the results obtained by using them cannot be considered as precise or accurate but were approximations whose probable errors may be large.

company funds and some of those above onions, that is, some beef, flour, potatoes, onions and sugar.

Table 4 needs scarcely any explanation, but attention might be called to a few facts. The bones of

TABLE III.—UNCOOKED FOOD OF GARRISON RATION FOR 10 DAYS. WEIGHTS IN POUNDS. DAILY AVERAGE, 440.4 MEN.

	Gross Weight.	Waste.	Net Weight.	Water.	Protein.	Fats.	Carbohydrates.	Salts.	Calories.
Bacon	2738¾	38¾	270	54.00	21.60	187.65	. . .	6.75	831,600
Beans	4284½	. . .	4284½	54.05	99.10	8.57	253.80	13.29	691,228
Pork	3439¾	31	3129¾	37.85	2.82	259.00	. . .	13.14	1,097,733
Sugar, brown	731	. . .	731	21.93	. . .	. . .	705.42	3.66	1,312,081
Flour	4379	126½	4252½	531.56	467.78	46.78	3185.12	21.26	6,991,110
Beef	5025	1131	3894	2196.70	682.97	978.38	. . .	35.95	5,469,392
Potatoes	5116	1386	3730	2943.00	78.33	3.73	667.67	37.30	1,388,750
Onions	700	150	550	481.80	7.70	1.65	55.55	3.30	123,750
Oatmeal	44	. . .	44	3.34	6.65	3.13	30.01	.88	81,400
Cornmeal	85	. . .	85	12.75	7.82	3.23	60.01	1.19	139,825
Apples, canned	10	. . .	10	8.32	.02	.04	1.39	.03	3,150
Apples, dried	183	. . .	183	46.85	1.65	3.30	130.85	2.57	259,494
Taploca [26] and Corn Starch [13]	39	. . .	39	.78	. . .	. . .	38.14	.08	70,980
Butter	58	. . .	58	6.09	.58	49.30	.29	1.74	209,670
Syrup	165	. . .	165	70.60	. . .	. . .	90.60	3.80	168,795
Lard	1071½	. . .	1071½	12.90	.65	89.66	. . .	4.30	383,775
Rice	26	. . .	26	3.22	1.92	.14	20.65	.14	42,380
Corn, canned	63	. . .	63	51.22	1.77	.70	8.32	.38	21,735
Tomatoes, canned	332	. . .	332	318.72	2.66	1.33	8.30	1.00	26,560
Maccaroni [51] and Vermicelli [1½]	52½	. . .	52½	6.88	4.73	.15	40.32	.42	73,815
Milk, fresh, pounds	31	. . .	31	25.61	1.58	1.50	2.00	.31	12,552
Milk, condensed, pounds	31	. . .	31	7.75	5.27	3.41	13.64	.93	49,442
Cheese	10½	½	10	3.50	3.20	2.20	.50	.50	16,000
Prunes	35	20	15	10.00	.75	. . .	4.00	.25	3,500
Cabbage and Sauerkraut	250	50	200	182.00	4.20	.60	11.00	2.20	31,000
Ham	32	4	28	11.63	4.68	11.00	. . .	.76	54,880
Apricots	20	. . .	20	13.50	.40	. . .	6.00	.12	9,200
Barley	5	. . .	5	. . .	.65	.14	3.80	.15	9,000
Peas	4½	. . .	4½	.55	1.20	.08	2.54	.12	7,043
Raisins	14	4	10	6.45	.05	. . .	3.50	.08	6,153
Chocolate	3	. . .	3	.48	.60	1.50	.30	.12	7,950
Totals	18598	2908¾	15689¼	7120.50	1413.21	1657.17	5343.66	154.82	19,446,960
	Pounds.			Grams.					
Daily average per man	4.22	.66	3.56	733	145	171	550	16	4,416
Counting flour as bread, amount eaten is 4 lbs. per man. Per cent. of amount eaten		15 1/26	81 5/26						
Including Table V (salts only), grammes				45	9	11	34	1.	
Including estimated amounts in Tables V and VII	5	¾	4¼ about 2.8 lbs. water free.	733	145	171	550	34	

REMARKS ON TABLE III.

The amounts of beef were calculated as follows,—After deducting 993¼ pounds bone, and 37¾ pounds other wastes, the rest was considered as edible, and its composition calculated according to Atwater's percentages, but there was a further waste of about 100 pounds fats, and that amount was subsequently deducted from the amount of fats and its heat energy taken from the number of calorics.

There were 4,546 rations of bread used, amounting to 5,114¼ pounds of bread, a ration of bread being 18 ounces. From this is deducted 167¾ pounds of bread wasted, leaving the amount eaten, 4,946½ pounds of bread. During the month of March, 10,300 pounds of flour were used in the Post Bakery to make 13,669 pounds of bread, so that the 4,946½ pounds of bread eaten represents 3,727½ pounds of flour. The bread wasted (167¾ pounds) contains 126½ pounds of flour, so that the flour used was 3,854 pounds. To this is added 525 pounds flour purchased for other purposes, making the total flour used 4,379 pounds, and eaten 4,252½ pounds.

The bacon is estimated from the tables of Letheby, neither of the estimates there given can refer to the fat and smoked variety supplied to the soldier.

Everything below onions was purchased from the

TABLE IV.—PERCENTAGE OF WASTES.

Bacon	1.40	
Pork	8.00	Only 9 lbs. were reported, but this was increased to 31 lbs., to include bones, etc.
Bread	3.30	Crusts and small unavoidable wastes.
Beef	22.50	19¾ bone, 2¾ fat and other wastes.
Potatoes	27.09	Parings and defective ones.
Onions	21.04	" "
Prunes	33.00	Stones and other wastes.
Cabbage	45.00	
Ham	12.00	Estimated.

beef were weighed with great care, and the result 19¾ per cent. agrees almost exactly with Atwater's tables. The percentage of bone usually given (17) is too small. The law that states that the soldier is to get a ration of 20 ounces of beef has always been interpreted to mean gross weight, so that he gets but 15½ ounces edible meat, and as physiologists in referring to the army ration, imply that the food is essentially 1 pound bread and 1¼ bone free meat, there has always been a misapprehension. In Dr. Dalton's minimum diet of 19 ounces of bread, 16 ounces of beef, and 3½ ounces of fat, the meat is all edible. It is an open question whether there is any justification for considering the law as referring to bone-free beef; an overpowering spirit of generosity would suggest the latter.

In the case of potatoes there is a large waste,

27.09 per cent. which is what might be expected, so that there is really served to the soldier only 11 ounces instead of 16.

Onions have a waste of 21.04 per cent. which is apparently correct.

Bread, beef, potatoes and onions were very carefully determined. There were wastes in the following articles, but so small in amount that they have been ignored: beans, rice, macaroni, hash, dried apples.

Where there are efficient cooks, the kitchen waste contains nothing of any food value to the soldiers, and is thrown away as in civil life. Though it may have a value for fertilizer or for live stock, there is usually no market. It is often the custom for each company to keep hogs, but the surroundings are apt to get in such an unsanitary condition that the practice is usually abandoned on the score of health. The bones might be of value, particularly in this State, for the market value of bone dust is said to be sixty dollars a ton, and taking the local value of bones at thirty dollars, there is a loss of one thousand dollars a year at this post from the bones thrown away.

TABLE V.—ADDITIONAL ARTICLES CONSUMED.

	Daily per man.	Allowance.	
338 lbs. green coffee	1.23 oz.	1.60 oz. or	
8 lbs. tea	.03 oz.	.32 oz.	
20 gall. vinegar	.14 gill	.32 gill	Allowance is large, to allow of making a saving to be used in making sauerkraut and pickles in the fall.
128 lbs. salt	.46 oz.	.64 oz.	
10 lbs. pepper	.036 oz.	.04 oz.	
11 bottles flavoring extracts.			
3 lbs. mustard.			
24 lbs. baking powd'r			
6 lbs. currants.			
5 gall. pickles.			
4 kegs pickled pigs' feet			Though containing much energy, it is omitted because composition is unknown, and the actual amount per man is very small.

Table 5 contains a list of articles which were supplied and consumed, but as they contain practically no nutriment, they have been omitted from table 3.

TABLE VI.—CONSUMPTION AND ALLOWANCE PER MAN.

	Daily per man.	Allowance.	
4,379 lbs. flour	15.91 oz.	18 oz.	Includes purchases.
4,946½ lbs. bread	17.97 oz.	18 oz.	
343¾ lbs. pork	1.34 oz.	1.3 oz.	
275¾ lbs. bacon	1.00 oz.	2.4 oz.	
5,025 lbs. beef	18.30 oz.	18.0 oz.	
5,116 lbs. potatoes	18.5 oz.	12.8 oz.	80% of vegetables.
700 lbs. onions	2.5 oz.	3.2 oz.	20% of "
4284 lbs. beans	1.5 oz.	2.4 oz.	
763 lbs. sugar	2.7 oz.	2.4 oz.	
64 lbs. butter	.2 oz.	.....	
137 lbs. lard	.5 oz.	.....	
15 gall. syrup	.4 gill	.....	

Table 6, giving the amounts used per man with the allowance of a few articles in table 3 is given merely to supplement the latter table and contains only the items used in the greater amounts.

The following articles were in greater quantities than the ration, the excess being purchase: Beef, potatoes, flour, and sugar. The savings were chiefly on flour (from bakery) and bacon. Almost all of the companies bought beef, potatoes, lard, syrup, and baking powder, and a few bought flour, butter and bread. The use of butter, lard or syrup bears out the ideas of certain officers that one of these articles should be an article of issue and not of purchase, on the supposition that the company fund should be used to purchase articles of occasional use and not articles of constant use. The expenditures for extra food during these ten days were larger than the average expenditures for the three months of January, February, and March. With rare exceptions the soldier uses more than his allowance of potatoes.

FOOD EATEN AT POST EXCHANGE.

Table 7 gives the itemized amounts of food eaten at the Post Exchange lunch counter during the ten

TABLE VII.—AMOUNTS OF FOOD EATEN AT POST EXCHANGE.

	Protein.	Fats.	Carbohydrates.	Alcohol.	Calories.
161 lbs. flour	17.71	1.77	121.00	..	264,684
6 " butter	.06	5.10	.03	..	21,690
55 " ham	9.19	21.51	.	..	107,800
6 " sugar, brown	.	.	5.80	..	10,770
16 " " granulated	.	.	15.65	..	29,120
30 " cheese	9.90	6.60	1.50	..	48,000
67 " sausage	9.25	28.70	.	..	138,355
30 " lard	1.20	16.68	.	..	71,400
100 " canned fruit	.20	.40	16.00	..	13,500
80 " oysters	4.80	1.00	2.96	..	18,400
14 " salmon, canned	3.02	1.88	.	..	13,510
14 " shrimps, "	2.10	.15	.	..	7,365
10 " prunes	.15	.	4.50	..	4,500
36 " crackers	3.71	3.39	25.38	..	68,400
10 " eggs	1.50	1.05	.	..	7,210
11 " milk	1.87	1.21	4.84	..	17,182
10 " mincemeat	.80	1.00	.20	..	60,782
Total, 646 lbs	65.46	90.44	197.86	..	902,668
Per man, daily, .15 lbs. Grams	7	9	20	..	205
Beer, percentage composition by weight	.54	. . .	4.8	4.15	. . . .
20 oz. daily per man (Ounces	.11	. . .	.960	.83	286
20 oz. daily per man (Grams	3.	. . .	27	24	286

days. The men who ate this food were, according to the officer in charge, wholly among the 440 men of the companies, the other soldiers at the Post who board themselves do not patronize this lunch counter. Some of the results are necessarily assumed for no authentic percentage tables of values are probably in existence, but each value was calculated from the tables of value of similar articles in Pavy's work on Foods. It is probable that the aggregate error is not large, as the articles referred to, canned oysters, shrimps, canned fruit, mince meat, etc., are in small amounts and besides do not contain much energy per pound.

In the Post Exchange there were sold during the ten days, 3,744 bottles (quarts) of beer. The officer in charge reports that the 440 men of the companies whose food is being calculated, drank their proportional share, and as there was a daily average of 473 men present, it would give an average of 24 ounces per man. As some men drank while others did not, it is probable that a few of the former occasionally took more than they could assimilate and counting the undigested as waste, 20 ounces per man are therefore assumed as the daily average consumption, and this corresponds with the minimum allowed to a healthy man by Parkes, one to two pints of 20 ounces each. The percentage composition of this beer was furnished by the analyst of the brewing company and the calculated values are stated separately in order that he who does not believe that the small amount of alcohol and carbo-hydrates of beer can serve any useful purpose in the economy towards the production of energy, can omit the beer if he chooses. Alcohol being between fats and carbo-hydrates in heat production, is assumed to have heat value of 1½ times its weight of carbo-hydrates.

All other alcoholic beverages consumed during the same time are unknown, they cannot even be assumed,

and as they add some energy to the sum total, the results given without them can be therefore very safely taken as below the actual alcohol used per man, rather than above it.

Thus the whole amount of food eaten in ten days by 440 healthy, active men in the prime of life, is known within a very few pounds. All sources of outside supply are absent, they can get food at no other places. There is a trader's store, but on inquiry it is stated that the amount of food purchased (crackers, cakes, candy, etc.) is so small that the daily average amount per man is probably less than a gram of each of the alimentary principles. For these reasons much care has been taken to calculate the proper values, in order to give as great an accuracy to the results obtained as is possible, while at the same time illustrating the actual food of the soldier. A word might be said as to the other conditions. The men during this time were fairly active, having daily drills, and fatigue duty, once a week gymastics, and large numbers patronizing the gymnasium and other sports during leisure hours. The weather was cold, averaging 24° F., ranging from 64° above zero to 1° below. It must be remembered that the results represent nothing more than stated, and as elsewhere explained there should be no attempt made to give these figures as the proper food values necessary to keep in health an active man in the prime of life and performing moderate labor. That this food appears to keep the men in health, cannot be denied for an instant.

THE RATION IN THE FIELD.

When troops are in a permanent camp close to markets, and cooking facilities are improvised, the ration may be essentially the same as that already described in garrison. When at a distance from markets and from the base of supplies, it is not so varied, for purchases are impossible and the food is absolutely limited to that which they have been able to carry with them in supply wagons. The ideas of different officers vary somewhat as to what are the best and most palatable articles for camping, but the following is the list from which choice is to be made.

TABLE VIII.—RATION IN THE FIELD.

Meat	12 oz. fat pork or 12 oz. fat bacon.
Bread	18 oz. flour or 16 oz. hard bread.
Vegetables	2 2-5 oz. beans or 2 2-5 oz. peas or 1 3-5 oz. rice or 1 3-5 oz. hominy.
Fresh vegetables	16 oz. potatoes (if they can be carried).
Coffee	1 3-5 oz. green coffee or 1 5-25 oz. roasted coffee or 8-25 oz. tea.
Sugar	2 2-5 oz. brown sugar.

If dried vegetables cannot be cooked, the money value thereof may be issued in meat or bread.

This amounts in alimentary principles to the following:

		Protein.	Fats.	Carbo-hydrates.	Calories.
Grams.	Maximum	106	320	540	5,166
	Minimum	64	240	460	4,722
Average		85	280	500	4,944

The detailed figures are not given, as the averages thus shown are sufficient for practical purposes of comparison. The most striking fact about this ration is the deficiency of protein. The fats are not in excess, considering the conditions of service, and the high rate of heat energy is due in great part to the fats of the pork or bacon. These facts are enlarged upon below.

RATION ON THE MARCH.

When on the march where good camps can be made every night and transportation facilities are abundant, the ration is the same as for the camp already described, but when the troops are compelled to march every day, certain changes may become necessary. The dried vegetables are in such small amounts that they do not alter the relative proportion of the various constituents, and they are omitted in the following discussion. If the country is well settled, fresh meat and vegetables may be procured by purchases from the company fund, but in the wilderness it is a choice between pork and bacon. For its convenience in frying, bacon is usually carried. Pork is not so convenient but by the following method is said to be preferable. Capt. W. F. Spurgin, 21st Infantry, a recognized authority on the ration, writes that during the Nez Perces campaign in 1877, when the troops were following the Indians hundreds of miles, he would on making camp, start a fire and have the pork thoroughly boiled; this was put away to cool and be used during the next day. At the same time some soup stock, which was carried along, was quickly made into a good soup for dinner. Whenever it was convenient and bones could be secured, enough soup stock was made by prolonged boiling to last several days. Beans were also prepared by cooking them over night.

The hard bread (16 ounces) and flour (18 ounces) do not differ much in their ultimate composition and it is immaterial which shall be carried. When the camps are convenient enough, some form of biscuits can be made with the yeast powder supplied, and in such circumstances flour is taken.

In regard to the nutriment contained, it *is* material whether pork or bacon be used. The fat salt pork contains but a small amount of protein (.9 per cent.) and a large proportion of fat, probably 85 per cent.; the bacon contains far more protein and less fat, but the actual percentage composition has not been experimentally determined. The analysis of bacon by Letheby (8.8 protein and 73.3 fat) refers evidently to dried breakfast bacon; the soldier's bacon contains less meat and more water and is therefore estimated to contain 8 per cent. protein and 69.5 per cent. fat. If fat pork is taken there is a great deficiency of protein and an apparent excess of fats (320 gram.), but the fats are not excessive when it is considered that the active out door life of the camp with its exposures, makes necessary an increased supply of the fats. Indeed, 320 grammes are even below the amounts given by Atwater as consumed by various Massachusetts mechanics. As the bacon contains nearly as much fat as the pork and much more protein it would appear to be a better material for continued use, when fresh meat is not procurable, and it is probably preferred by a majority of officers. If ham or salt beef were used to supply protein, they would not contain enough fat nor relieve the desire for fresh meat. Both of these articles are taken into the field, and the salt beef, though derided during the war as "salt-horse," is even yet considered a

desirable article by officers who used it for years Difficulty of transporting it on rapid marches weighs against it for field use; but for garrison use, an officer of large experience has lately spoken of it in very high terms, as an occasional issue optional with the company commander. In the future it may be entirely supplanted by canned meats, fresh or corned. If the camp is a permanent or large one, the matter of pork and bacon may not arise, for either a beef contractor will be on hand with cattle, or cattle will be purchased by the commissary officers, in accordance with regulations, and driven along with the troops when forage or grazing is procurable. There is an actual craving for fresh meat, and whenever it is possible, it is supplied by purchase; hunting is encouraged whenever practicable, but often fresh meat is entirely barred out by the barrenness of the country particularly in Indian campaigns. It is this need of fresh meat which induces the foraging expeditions of soldiers in camp—expeditions which often are disastrous to the occupied territory.

LIMITATION OF VARIETY OF DIET IN THE FIELD.

In the above field rations, the limitation of variety is due to either difficulty of supply or inefficiency of portable cooking utensils. The nearer the camp is to the markets of civilization, or the more permanent it is, the more nearly will the food approximate to what is used in garrison. There is no theoretical reason why the food in camp should be a particle different from what is used at home, provided there is more of it and there are more fats to supply the extra energy needed for warmth and work. The writer once asked an old packer and teamster accustomed for many years to the life of the wilderness, what kind of foods were best for camp; after considerable thought he answered, "anything good to eat," there was no theory in that answer—it was purely practical experience.

When soldiers are in the field and are limited to the bare ration, and more particularly when lack of transportation limits the ration to bacon, hard tack and coffee, they suffer very badly from constipation. Company commanders who understand this matter, have a simple remedy for their men, in dessicated fruits. These are purchased and carried along, and being light and uninjured by freezing they are always available. There is so much water in fresh fruit, that when dried out, 1 pound of evaporated or dessicated apples at 4 cents will make enough apple sauce for many men, and the expense to the company is trifling. The Canadian mounted police are said to have dried fruit as part of their ration. The commissary officer at Fort Assinniboine, Mont., Lt. J. F. Morrison, who used dried fruit in the field for his men, is very enthusiastic as to their great excellence in combating constipation. Besides all this, as antiscorbutics, they are of great value should the field service last any length of time, for though scurvy could never occur in garrison, there would be a tendency to it, with the above limited diet.

After hard work when one is depressed and worn out, there is nothing that relieves all ill feelings so soon as a hot drink that is at the same time stimulating. Spirits have been totally discarded with soldiers for this purpose as thoroughly vicious in results. Wines and beer are used in foreign services, but public sentiment will never allow them in the United States. It has been proposed to issue to soldiers in the field, extract of beef, whose stimulating qualities in the form of beef tea are too well known to be enlarged upon here. Now if the extract of beef can be combined with nourishment in the form of soups, a vast deal is to be gained. There can be no doubt that strong soups are highly appreciated in camp, and so experienced an officer as Capt. Spurgin states that it was his custom to make soup for his men, and that he found nothing like it as a hunger killer. Now, if the hunger-killer in the form of soup contains sufficient nutriment for part of a meal, it is a most desirable thing for hungry men who may have to sleep with the heavens for a tent. There is a popular delusion which ascribes to clear soups a much higher nutritive value than they possess. Raw bones contain considerable nutriment, not only fats but protein, and are capable of sustaining life. Though some animals can easily digest raw bones, man cannot; perhaps he could very readily if they were ground to powder. Pavy states that one pound of bones, contains as much carbon as there is in $\frac{1}{3}$ pound of meat, and as much nitrogen as there is in $\frac{1}{7}$ pound of meat. All this refers to raw bones, and in dilating upon the value of bones as a food, writers usually overlook a most important matter. The Paris Gelatine Commission, after ten years of uninterrupted experiments reported that "it is not possible by any known process to extract from bones an aliment which, either alone or mixed with other substances, can take the place of meat," and furthermore they reported that "every kind of preparation, such as decoction with water, the action of hydrochloric acid, and particularly the transformation into gelatine diminishes, and seems even, in certain cases, almost completely to destroy the nutritive quality of bones." After fifty years these conclusions, as far as known, are still accepted. By prolonged boiling of bones, the nitrogenous substances are converted into gelatine, which is dissolved in the water. Gelatine has been denounced as a totally useless agent, but it undoubtedly gives up some energy, though it is extremely doubtful if it is of any further use than as a fuel and a very poor fuel at that. It will not support life. When, therefore, the raw bones of beef are thrown away, the soldier loses very little available nutriment except the marrow, but there is a loss of variety of diet, and it has already been shown that variety though often impossible to obtain should always be sought. Soups add so much to attractiveness if nothing else, that they should be given at least four or five times a week in garrison, and in those companies where the bones are all carefully saved and boiled the men certainly do live better. Though all this is true of clear soups which may not contain much nutriment, it is entirely different with thick soups made from leguminous vegetables, or with other mixtures called soups. Pea and bean soup in particular contain quite a large percentage of the various alimentary principles. The difficulty of preparing the soups in the field is obviated by using one of the prepared articles mentioned more fully below. There is one in particular, consisting of a mixture of powdered peas, salts, extract of beef, herbs, etc., and sold in packages under the name of "pea-soup." The powder added to a quart of hot water makes in a few minutes a tolerably fair soup, rich, savory and nutritious. The published analysis, the accuracy of which is presumably correct, gives to a 3½ ounce package the following ingredients:

Protein, 21 grams; fats, 17¼ grams; carbohydrates, 46½ grams.

Now in the field ration there is a deficiency of nitrogen which can be remedied either by using more bacon or by the use of one of these prepared soups. One of these packages would therefore give a ration with the following values:

	Protein.	Fats.	Carbohydrates.	Calories.
Maximum	127	337	586	5,614
Minimum	85	257	506	5,160
Average	106	297	546	5,387

A package of 2⅝ ounces contains as much energy as the edible portion of the ration of potatoes (11 ounces) and a proposed package of 4 ounces has the energy of 1.8 rations of potatoes, though it contains far more protein and fat though less carbohydrates than the potatoes of the same amount of energy. It is proposed to use this prepared soup in the field in lieu of fresh vegetables allowed by law.

It may be added that in the field in war times, the transportation is usually insufficient. Officers of this military department know it and the subject receives constant attention throughout the world, for on it depends the success of the campaign. Notwithstanding all that is done, impediments will arise, break-downs occur, and roads become blocked. This always results in deficiency of food, for the rations in enormous quantities may be near by but unattainable, and the troops may be actually incapacitated for good fighting. This state of affairs may occur at any time and it is usually unavoidable. Again, in forced marches troops may be able to outstrip the wagon trains and then they must carry their own food. Numerous field dietaries containing ordinary articles of diet have been suggested from time to time for those special conditions, but as they have had time to crystalize into some definite shape and have not done so, it is presumed that they are mostly impracticable.

PREPARED FOODS.

For the same reasons already mentioned above, condensed and prepared foods have probably occupied the attention of military men from time immemorial; and Parke's Hygiene in speaking of these foods says: "For the military surgeon this subject is so important that it is desirable to put the chief facts under a separate Section." He then gives a list of many preparations of powdered meats, etc., but unfortunately states that many of these were unsatisfactory.

The difficulty in preparing and preserving foods is yearly becoming less and less. It is only within recent years that much attention has been paid to the proper preservation of fresh foods, and we can confidently expect in the future to see much further advance. Specially prepared foods have also attained a high degree of excellence; those intended for infants and invalids receive most attention because most demanded. Of the foods for adults probably the most successful so far are the prepared soups. The German army has had for a long time its Erbswurst, a mixture of pea-meal, fat, bacon, herbs, onions, etc., put up in little sausage-like rolls to be carried by the soldiers. Its present percentage composition is not at hand, but it is said to contain protein, fats, carbohydrates and salts in about the proportions needed in a food. The latest preparations are the pea and bean soups, made by an English, and several American firms. In each case the material is a powder more or less dry, and in some cases compressed, and when added to hot water makes a good soup, which is quite palatable to the majority of people. Lieut. W. C. Brown, 1st U. S. Cavalry, to whom the writer is indebted for all of the facts relative to the prepared soups, has used them in the field when the weather was very hot, and when a blizzard buried his camp under 12 inches of snow, and he speaks in no uncertain terms of their great value and excellence, and of the ease with which they can be preserved, transported and made ready for use.

There are very numerous prepared foods, either cooked, condensed, or compressed, which are being brought forward for use in such circumstances as surround people in camp. Dessicated vegetables have been given a trial in the U. S. Navy, and as far as known have not proved objectionable. Almost every variety of food is now being put up in the fresh state and preserved indefinitely, but most of them, particularly the fruits and vegetables are not suitable for military use in the field on account of their bulk, and their inability to stand rough handling, and the extremes of temperature. For garrison use at isolated posts where there is no market there is no reasonable objection to them. The great value of evaporated fruits for field use has already been mentioned, and they can be so compressed by machinery as to obviate objections as to bulk.

The universal experience of military men testifies to the absolute necessity of tea or coffee. The latter is generally preferred, but the writer's experience points to tea as preferable in the long run. Now each is difficult to carry and protect from damage, and the experience of foreign services is to the effect that if they are compressed into small bulk a vast improvement is made as to facility of transportation and preservation. In our own service during the civil war, extract of coffee combined with milk and sugar was issued in lieu of coffee and sugar, but with what degree of satisfaction the writer is ignorant. At the present time these compressed teas and coffees are quite satisfactory in other services.

A discussion of condensed food among military men brings forcibly to light a false conception which all non-medical men are apt to foster. It is believed that foods can be so extracted and condensed that a teaspoonful will be of the same value as a pound of the crude food. Beef extract is often held up as the ideal concentrated food. It is forgotten that what a man wants is so many ounces of combustible material for its heat energy, and that beyond the concentration due to exclusion of water and indigestible portions nothing further is practicable. Indeed, it is not improbable that a few officers believe that it ought to be practicable to so condense foods that a soldier can carry in his watch fob enough for a week. When a ton of anthracite coal can be compressed into a water bucket, then and then only can foods be condensed to suit such beliefs.

It is well known that on rare occasions the soldier is called upon to perform the most laborious duties, under almost inconceivable exposures and hardships, and it can well be assumed that at such times his food should be liberal to the point of extravagance. But unfortunately it is in just such circumstances that it is impossible to carry along the necessary appliances. It is purely then a matter of transportation, and the most concentrated foods are the only ones carried—bacon, hardtack and coffee—a scorbutic diet. Omit-

ting thoughts of plum pudding and pound cake, he must even be deprived of things that in civilization are considered necessary—a baked potato would be a luxury. These are the circumstances in which the Erbswurst of the Germans and the dried pea soup of the English have found their greatest efficieney. It is understood that in the wilds of Africa and Asia, the English troops found the latter food of the greatest utility, on account of the impossibility of transporting anything bulky. As lack of transportation bars out potatoes first, it has been suggested by Lieut. W. C. Brown to issue the above pea soup or similar preparation, in lieu of potatoes. This will be done as there is probably ample authority by law, and it can be done without increasing the ration. It is believed that the matter is being giving very earnest consideration in our own army.

OBJECTIONS TO PREPARED FOODS.

The one great objection to prepared foods is the ease with which adulterations and other frauds can be perpetrated. Quality of foods can be easily determined if seen in the natural state, but let them be ground up and mixed with other things, and fraud may be difficult or impossible to detect. Good housekeepers will not buy with their eyes shut. The above objection applies far more forcibly to military foods where the consumer is never the purchaser, the cupidity and avariciousness of contractors is greatly stimulated. It is a strange fact that though contractors know that at times the lives of the soldiers and the safety of the nation may depend on the character of the army supplies, they will yet jeopardize the lives of thousands of men by fraudulently supplying inferior articles. The disasters and sufferings during the Crimean war were increased to a great extent by the poor grade of supplies. The military history of the United States furnishes a host of illustrations of operations and even campaigns being hampered or even made disastrous by faulty food. The German government escaped this dilemma by making its own Erbswurst, and if any government makes its soldiers' arms, ammunition, clothing and shelter, it can surely make his food. The objection is lessened when it is remembered that prepared foods are not intended as a sole diet, but merely to piece out the notoriously rough field diet, and the objection may entirely disappear by an efficient system of analysis and inspection. Above all this it may be argued that if easily transported prepared, cooked foods are to be a valuable innovation, it might be justifiable to run the risk of being occasionally furnished with inferior grades, a risk that we run in the majority of mercantile transactions.

During the civil war, it is stated that roasted and ground coffee was greatly objected to on account of adulteration, but it has also been stated that the adulteration was done openly, ground and roasted rye being purchased for the purpose. In regard to adulterated coffee the writer has seen somewhere a statement that the average soldier prefers coffee that is adulterated with chiccory.

Another objection to concentrated foods as a sole and continuous diet is the fact that they do not furnish enough bulk of food. Though they may contain the proper amounts of energy and alimentary principles they can never be used exclusively. But they are not intended to be so used except in emergencies and for short periods.

TRAVEL RATION.

When cooking is impracticable on account of traveling by cars, or rapid marches or for other reasons, a special cooked ration is issued. The items of this ration are stated in table 9.

TABLE IX.—TRAVEL RATION.

Meat	12 oz. canned beef, fresh or corned.	Total weight, 2 to 2½ lbs.
Bread	18 oz. soft bread or 16 oz. hard bread	
Vegetables	½ to ½ lb. baked beans.	
Coffee	21 cents a day for the purchase of liquid coffee en route.	

The above has the following composition (approximately):

		Protein.	Fats.	Carbohydrates.	Calories.
Grams	Maximum	150	170	417	3,900
	Minimum	120	94	380	2,900
Mean		135	132	400	3,400

This ration is insufficient for active men, being equivalent to the food of men of sedentary habits. The protein is the only ingredient in nearly the proper amount, and this arises from the meats and beans. As this ration is intended for short periods of inactivity (on cars, etc.) it might be said that the insufficiency is more apparent than real, but as men traveling usually develop enormous appetites they may need more than when in garrison. Nevertheless, it might be improved by the addition of prepared soups as in the case of the field ration.

A further defect of this ration is the inability of a man to carry enough for several days should military necessity compel him to be detached from the main command, carrying dispatches, scouting, etc. On such occasions he must learn to do as the Indian does,—twice a day take a drink of water and tighten his belt.

COMMUTATION OF RATION.

When small parties of soldiers are detached and it is impracticable to furnish them either cooked or uncooked rations and they are so situated that they can buy their meals, they are paid a certain sum in lieu of food. The ration cost about 14 or 15 cents (approximately) but when the soldier is on leave he is allowed 25 cents a day, when on detached duty 30 cents (non-commissioned officer 40 cents) and when traveling $1.50 a day.

TABLE X.—COMPARISON OF FOODS OF SOLDIER WITH VARIOUS OTHER DIETARIES.

	Grams.				Grains.	
	Protein.	Fats.	Carbohydrates.	Calories.	Nitrogen.	Carbon.
German soldier (peace footing)	114	39	480	2800	277	4443
Fully fed tailors, England	131	39	525	3055	318	4862
Travel ration, U. S.	135	132	400	3400	328	5194
Machinist (Connecticut)	105	147	399	3435	255	5145
Factory operatives (Massachusetts)	114	150	522	4000	277	6048
Factory operatives (French Canadians) Mass.	118	204	549	4630	287	6901
German ration, war (extraordinary)	157	285	331	4650	382	6750
U. S. garrison ration (including canteen)	152	180	570	4621	370	6805
Same (including beer)	155	180	633	4907	377	7446
U. S. field ration (average)	85	280	500	5000	206	7347
Machinist (Massachusetts)	182	254	617	5640	442	8423
Teamsters, hard work, Massachusetts	254	363	896	7805	617	9950

The U. S. rations would be slightly increased by including the amounts of nutriment in the articles of table 5.

Table 10 is prepared to show at a glance how the various rations discussed compare with the food of civilians. They are tabulated with various dietaries that have been published by Atwater. It is thus shown, that as far as the total energy is concerned the various rations compare rather favorably with the dietaries of various laborers in the United States. Only one dietary of foreign laborers is given for they are all less than those of American laborers of the same grade—the foreign workman, according to Atwater, being as much underfed as some American workmen are overfed. The field ration would be reduced in carbohydrates if potatoes could not be carried. Taking the largest dietary on the list as unity,—that is, the food of teamsters in Massachusetts doing hard work,—the energy of the various rations would be as follows: Field ration $\frac{19}{20}$; garrison ration, $\frac{9}{15}$; travel ration $\frac{7}{15}$.

The rations of foreign armies approximate to the usual food of the people, which as we have just seen is less than that of Americans; for this reason it is unfair to compare the U. S. ration with that of foreign armies, unfair to the former, which by the contrast appears more liberal than it is, unfair to the latter which similarly is apparently illiberal or actually deficient.

TABLE XI.—ESTIMATED PROPORTIONS OF ORDINARY DIETARIES.

	Protein.	Fat.	Carbohydrates.	Salts.
Playfair (moderate exercise and soldiers in pence)	100	33	443	17
Moleschott	100	65	215	23
Pettenkofer & Volt	100	87	258	22
U. S. travel ration	100	98	296	24
Ranke	100	100	240	25
U. S. garrison ration	100	117	400	24
U. S. field ration	100	329	588	24

The larger percentage of fats over protein in the U. S. rations in table 11 corresponds to the increased proportion of fats over protein found in all American dietaries according to Atwater, a still further evidence of the unfairness of comparing the U. S. ration with that of foreign soldiers.

SPECIMEN DIETARIES.

There are given in tables 12 and 13, a week's bill of fare taken at random and furnished by two company commanders, one at Fort Assinniboine, Montana, and the other at a hot southern post. These two are in the strongest contrast, the first so liberal, and the latter so bare, that they exemplify in the most fortunate way some of the remarks previously made as to the conditions of service varying the bill of fare. The company at Fort Assiniboine possessed an excellent cook and a large company fund, received nearly $50 a month from the Post Exchange, at the time chosen had vegetables from a fairly good garden, and could purchase extras fairly reasonably from neighboring towns and even St. Paul, but none of the conditions were as good as at other posts with excellent gardens, large receipts from the Exchange and convenient to good markets. The other company had no fund, no receipts from Post Exchange, no garden, no markets even if they had money to buy, and the result shows what the ration itself can do, supplemented as it was by $\frac{3}{4}$ to 1 pound potatoes daily per man purchased from meagre savings. Its commander also states as one reason for small "savings" that many of the soldiers are not much more than boys, and that they discover eating abilities surpassed by none except Indians. He is thoroughly alive to the interests of his men and gives much thought to the ration, and when favorably situated the company fared excellently. The bill of fare can therefore be correctly assumed to be the best that could have been done.

TABLE XII.

A company's dietary at Fort Assinniboine, Montana (Capt. Alfred Reynolds' Company).

December 1, 1891.

(Gravy always served with meats, and sauce with puddings.)

Breakfast: Beef stew, fried potatoes, corn bread, syrup, bread, butter, coffee.

Dinner: Meat pie, mash potatoes, turnips, cabbage, pickled pork, bread, coffee.

Supper: Beefsteak with onions, squash pie, bread and coffee.

December 2, 1891.

Breakfast: Roast beef, fried potatoes, bread, butter, coffee.

Dinner: Pea soup, roast beef, baked potatoes, stewed onions, cauliflower, tapioca pudding, bread and coffee.

Supper: Meat stew, fried carrots, apple pie, bread, coffee.

December 3, 1891.

Breakfast: Oatmeal, milk, meat hash, bread, coffee.

Dinner: Sauerkraut, pickled pork, mashed potatoes, pickbeets, rice pudding, bread and coffee.

Supper: Fried sausage meat, fried potatoes, green corn, blanc mange pudding, bread and coffee.

December 4, 1891.

Breakfast: Beefsteak with onions, fried potatoes, bread, coffee.

Dinner: Roast beef, mashed potatoes, stewed onions, pickled beets, plum pudding, bread, coffee.

Supper: Fried liver and bacon, fried carrots, squash pie, bread, coffee.

December 5, 1891.

Breakfast: Beefsteak, fried potatoes, bread, butter, coffee.

Dinner: Pork and beans, peach pie, bread, coffee.

Supper: Cold beef, corn bread, syrup, apple sauce, bread, coffee.

December 6, 1891.

Breakfast: Meat hash, oatmeal, milk, bread, butter, coffee.

Dinner: Vegetable soup, mashed potatoes, roast beef, pickles, tapioca pudding, bread, coffee.

Supper: Beef stew, green apple pie, bread, butter, coffee.

December 7, 1891.

Breakfast: Roast beef, baked potatoes, hot rolls, syrup, bread, butter, coffee.

Dinner: Sauerkraut, pickled pork, mashed potatoes, roast beef, bread, coffee.

Supper: Meat pie, rice pudding, bread, butter, coffee.

December 25, 1891, Christmas.

Breakfast: Meat hash, oatmeal, milk, hot rolls, bread, butter, coffee.

Dinner: Roast turkey, roast beef, green corn, French peas, ham, mashed potatoes, pickles, cranberry sauce, mince pie, jelly cake, sponge cake, bread, butter, coffee, almonds and filberts.

Supper: Oysters, cold ham, cold beef, apple sauce, assorted cakes, green apple pie, bread, butter, tea.

TABLE XIII.

A company dietary at a hot southern post.

(Gravy always served with meats, and sauce with puddings.)

April 1, 1892.

Breakfast: Beef hash, (with onions and potatoes) bread, coffee.

Dinner: Rice and tomato soup, roast beef, roasted potatoes, bread.

Supper: Beef, (same as dinner) bread, coffee.

April 2, 1892.

Breakfast: Irish stew, bread, coffee.

V. 18

Dinner: Pea soup (with toasted bread), roast beef, boiled potatoes, bread.
Supper: Beef, pancakes, syrup, bread, coffee.

April 3, 1892.

Breakfast: Meat hash (with potatoes and onions) bread and coffee.
Dinner: Roast beef, mashed potatoes, plum pudding, bread and coffee.
Supper: Fried liver and bacon, bread and coffee.

April 4, 1892.

Breakfast: Beef hash, bread and coffee.
Dinner: Baked fresh pork, baked beans, bread and coffee.
Supper: Beefsteak, fried potatoes, bread and coffee.

April 5, 1892.

Breakfast: Irish stew, bread and coffee.
Dinner: Rice and tomato soup, roast beef, boiled potatoes, bread.
Supper: Beef, fried potatoes, bread and coffee.

April 6, 1892.

Breakfast: Beef hash, bread and coffee.
Dinner: Rice and tomato soup, roast beef, boiled potatoes, spiced bread dressing, bread.
Supper: Meat pot-pie, bread and coffee.

April 7, 1892.

Breakfast: Fried pork, fried potatoes, bread and coffee.
Dinner: Pea soup, with toasted bread, roast beef, boiled potatoes, bread.
Supper: Beef, fried potatoes, bread, coffee.

In view of the above bills of fare, and of all that has been said about the ration, it must be stated that it is a notorious fact that when sensational complaints from soldiers are published in the newspapers, it too often happens that when sifted down, they are shown to come from men who are inclined to be vicious, and who before enlistment have been accustomed to far worse fare, but who think that to complain is sure evidence of personal superiority. These cases are apt to dampen the ardor of officers, who with rare exceptions, are thoroughly interested in the soldier's welfare.

For the major part of the data of this paper the writer is indebted to the courtesy of the officers serving at Fort Assinniboine, Montana, who have with painstaking care weighed and determined the foods used in their respective companies and supplied all data at their command.

ERBSWURST.

Of the legion of prepared foods that have been used for military purposes the only ones that have given much satisfaction, and to which there are few objections, are those made with powdered peas as a basis. In some armies these are now always sent into the field with troops to be used when other foods cannot be supplied. As Erbswurst is the pioneer of this class, and has been frequently referred to, a few words as to what it is may not be out of place, though they may repeat former reports to this Section. Captain Henry G. Sharpe, C. S., U. S. Army, who has devoted much time and study to this subject both at home and abroad, has very kindly furnished the following information from his reports.

"Erbswurst is a combination of pea meal and other articles, invented by a German cook named Grünberg, whose secret consisted in his method of preserving the legumine from the decay to which it is so prone. The German Government purchased the secret for $25,000. It was first used on a large scale in the Franco-Prussian war by the II army commanded by Prince Frederic Charles, who reported its great value to the war ministry July 16, 1870. The food was composed of pea meal, fat and bacon, and an extensive factory for making it was established at Berlin, under the supervision of Army Intendant Englehard. The factory commenced work on August 8 and in a few days furnished the first 100.000 pea sausages which under the name of "Erbswurst" became so widely known. This article of food met with such general approval that for a long time the factory had to supply the whole army with it. The factory ultimately extended its business to making other kinds of meat preserves and altogether sent some 40,000,000 rations to the field army. Other factories were established at Frankfort-on-the-Main, and Mainz.

This description of food had the advantage for the commissariat in being lighter for transport, and for the troops, especially for those on outpost duty, in being more easily prepared for consumption. The unavoidable sameness of the ration, was successfully compensated for by the large stores of wine found in the neighborhood of Paris, and by the occasional issue of an extra ration of brandy."

Parke's Hygiene states that when it was used too constantly not only did the men dislike it but it was liable to produce flatulence and diarrhœa. A soldier who has lately returned from a visit to Germany informs the writer that the soldiers in private conversation still speak of it in the highest terms. On account of certain seasoning ingredients in Erbswurst the English soldiers do not like it, though they are very fond of their similar preparation of pea soup.

TABLE XIV.—COMPOSITION OF SOME PREPARED MILITARY FOODS.

	Water.	Protein.	Fat.	Carbo-hydrates.	Wood-fiber.	Ash.	Authority.
Erbswurst	12.09	31.18	3.08	47.50	. .	6.15	Blythe.
" as first used	. .	16.00	35.00	27.00	. .	. .	Parkes.
" 1887	. .	15.70	23.00	. .	. .	. .	"
Dried pea soup (1)	7.58	16.93	8.98	53.44	1.34	11.73	Konig.
" " " (2)	8.08	15.81	24.41	36.78	1.69	13.53	"
Kopf's " "	4.78	21.09	17.25	46.45	4.40	6.03	S. P. Sharpless (Boston).
(used by the English army.)							

In table 14 are arranged some analyses of these pea-meal mixed foods. The English pea-soup appears to be drier than the others, and as the actual analysis above shows it to be so, it will probably keep better than the others. The percentage of fat though not great enough for American stomachs is far more than the first specimen of Erbswurst. If it were more fatty it would not keep as well as it does. Several American firms make dried pea soups and it is regretted that analyses of their products are not available for comparison.

MEDICAL EDUCATION OF WOMEN IN RUSSIA.—The establishment in Russia of a separate school of medicine for women which many people had hoped would soon be an accomplished fact has been postponed probably for an indefinite period. It is stated that the project has been set aside through the influence of the Minister of religion, who views the higher education of women in anything but a favorable light, being persuaded that the study of medicine leads to materialism and nihilism.

THE ASSOCIATION OF AMERICAN MEDICAL COLLEGES.

The recent Convention of representatives of the Southern Medical Colleges, held in Louisville, and the wide spread interest in this subject makes it pertinent at this time for THE JOURNAL to publish the proceedings of the meeting of The Association of American Medical Colleges, held in Detroit June 8, including the Constitution of that organization.

CONSTITUTION.

ARTICLE I.

This Association shall be known as the ASSOCIATION OF AMERICAN MEDICAL COLLEGES.

ARTICLE II.

§ 1. Colleges adopting and observing the rules of this Association, as herein provided, shall be eligible to membership. Each college shall be entitled to one representative at all the meetings of the Association.

§ 2. Colleges desiring membership in this Association, shall make written application to the Secretary, officially signed, and pay to the Treasurer of this Association the sum of five dollars ($5), annually, in advance.

ARTICLE III.

§ 1. Members of this Association shall require of all matriculates an English composition, in the handwriting of the applicant, of not less than two hundred words, an examination by a Committee of the Faculty, or other lawfully constituted Board of Examiners, in higher arithemetic, algebra, elementary physics and Latin prose.

§ 2. Graduates or matriculates of reputable colleges or high schools of the first grade, or normal schools established by State authority, or those who may have successfully passed the entrance examination provided by the statutes of the State of New York, may be exempted from the requirements enumerated in Section 1.

§ 3. Students conditioned in one or more of the branches enumerated as requirements for matriculation, shall have time until the beginning of the second year to make up such deficiencies; provided, however, that students who fail in any of the required branches in this second examination shall not be admitted to a second course.

§ 4. Colleges granting final examination on elementary subjects to junior students, shall not issue certificates of such final examination, nor shall any member of this Association confer the degree of Doctor of Medicine upon any person who has not been first examined upon all the branches of the curriculum by the faculty of the college granting the degree.

§ 5. Candidates for the degree of Doctor of Medicine shall have attended three courses of graded instruction of not less than six months each, in three separate years.

§ 6. Students who have matriculated in any regular college prior to July 1, 1892, shall be exempted from these requirements.

ARTICLE IV.

§ 1. The officers of this Association shall be a President, Senior and Junior Vice-Presidents, Secretary and Treasurer, and a Judicial Council of seven members: all of whom shall be elected annually by ballot and serve until the election of their successors.

§ 2. The President, or one of the Vice-Presidents in his absence, shall preside at all the meetings and perform such duties as parliamentary usage in deliberative assemblies and the By-Laws of this Association may require. Of the seven members constituting the Judicial Council, the three whose names appear first on the list of those first elected shall serve three years. Of the remaining four, the two first named shall serve two years, and the two last named shall serve for one year. Vacancies by expiration of term to be filled at the annual election of officers. Vacancies by death or resignation may, if business of importance arise, be filled by the surviving members in the interval between the annual meetings of the Association.

§ 3. The Secretary and Treasurer shall record the proceedings of the meetings, conduct the correspondence, receive dues and assessments from members, disburse the funds of the Association as provided by resolution, issue certificates of membership, and perform such other duties as the By-Laws may require.

§ 4. The Judicial Council shall investigate and determine all questions of violation of the rules and regulations of this Association, and all matters of dispute between the members of this Association. All charges or complaints shall be preferred formally in writing, and referred to the Council. The Council shall make written report at the next ensuing session of the Association, upon all matters received for adjudication.

ARTICLE V.

§ 1. The stated meetings of this Association shall occur annually on the day next succeeding that designated for the annual assembling of the American Medical Association.

§ 2. A majority of the members shall constitute a quorum.

ARTICLE VI.

This Constitution shall not be altered or amended, except by written notice to all the members, at least thirty days previous to a stated meeting, and by a vote of two-thirds of all the delegates present at such meeting.

The following papers were read and discussed at the last annual session:

TO WHAT EXTENT SHOULD CLINICAL INSTRUCTION BE AFFORDED STUDENTS OF MEDICINE IN REGULAR COURSE.

BY N. S. DAVIS, M.D., LL.D.,

DEAN OF NORTHWESTERN UNIVERSITY MEDICAL SCHOOL, (CHICAGO MEDICAL COLLEGE,) CHICAGO, ILL.

The subject of Clinical Instruction, as a part of the regular medical training required for the student during his attendance on his college courses, is one of much importance, and should receive more attention than has been hitherto given it. That the student should receive sufficient true clinical training to make him familiar with the means and methods of the examination of patients, the diagnostic symptoms of diseases, and the application of remedies, before being authorized to commence the practice of medicine and surgery, is generally admitted.

Whether such clinical training should take place while the student is actively engaged in prosecuting his medical college studies, or should be assigned to one or two years after he has completed the college curriculum, is a question concerning which much might be said. If the student is required to have a good general education and a fair degree of mental discipline before he commences the study of medicine, four years is certainly as long a period as three-fourths of the students can afford to spend in strictly professional study before they commence practice. Admitting this to be be true, I think both reason and experience show that the first of the four years should be devoted exclusively to the study of anatomy, physiology, chemistry, and materia medica with abundant practical work in the anatomical, histological, physiological and chemical laboratories with no clinics. But having thus gained at least an outline knowledge of the human body and its functions in health, and some knowledge of medicines, the student is fairly prepared to profit by one or two hours of direct clinical instruction each day during his second, third and fourth annual college courses. Such clinical instruction, however, should not be given to large classes in college and hospital amphitheatres or crowded wards, as is too generally done; but it should be so graded as to permit of adjustment to the need of each year's class, corresponding with

the grading of the several branches of the curriculum, For example, the first year of clinical instruction, which would correspond with the second year of medical study, should aim to make the student personally familiar with the physiognomy and symptomatology of diseases, and with the use of all instruments and appliances for accuracy of examination and diagnosis, both medical and surgical. The second clinical year should be chiefly occupied in the study of the actual pathological processes taking place in the different forms of disease and their relation to the symptoms, including personal examinations, chemical and microscopic, of the secretions and excretions in the several stages of progress of disease, as well as the tissue changes to be found after death. With these studies, the objects to be accomplished for counteracting the morbid processes, correcting the secretions, and preventing permanent or fatal tissue changes, should be clearly indicated. Having thus become clinically familiar with the symptoms, diagnosis and pathology of diseases and the indications desirable to fulfill in their management, the third clinical year should be devoted directly to the study of methods and means of treatment, preventive, hygienic, therapeutic and surgical.

The advantages to be gained by such grading of clinical studies as I have just indicated must be obvious to both the student and the clinical teacher: 1. By giving to each year of clinical study, limited and definite objects, the accomplishment of which makes his next year's work easier and more thorough, you not only make the student's practical knowledge more systematic and comprehensive, but you add much to his mental discipline and accuracy of observation. 2. Such a system necessarily limits the number of students in any one clinical class, and in the same ratio increases the opportunities and value of individual training, which is the most essential feature of all true clinical study. The dispensaries and hospitals of our larger cities in which the medical schools are chiefly located, contain an abundance of clinical material, that needs only judicious arrangement and faithful attention to secure both the most complete clinical instruction and the most skilful service for the sick. But as the subject is to be before you for further discussion, I will not occupy your time with details at present. The principle or system of grading the clinical instruction of students during their consecutive courses of medical college attendance, will be found no less important and advantageous than is the proper grading of the various branches of medicine contained in the college curriculum.

THE KIND AND AMOUNT OF LABORATORY WORK WHICH SHOULD BE REQUIRED IN OUR MEDICAL SCHOOLS.

BY VICTOR C. VAUGHAN, A.M., M.D.,
DEAN MEDICAL DEPARTMENT UNIVERSITY OF MICHIGAN.

Mr. President and Gentlemen:—It will not be necessary for me to take any time in giving the arguments in favor of teaching medical students by the laboratory method many of the sciences which must enter into the curriculum of study. I will take it for granted that all reputable teachers of medicine understand that analytical chemistry, practical anatomy, bacteriology, histology, physiology, analysis of urine, pathology, etc., must be taught in the laboratory in part at least, if taught at all. How can you expect a practitioner to tell whether a given bit of tissue is from a malignant growth or not, when he has never seen a cancer cell? How could he be trusted with such an examination when he has never used a microscope, cut a section, or made a microscopical mount? How can the young practitioner diagnositicate tuberculosis in its early stages, when he has had no practical experience in staining germs and when he would not recognize the bacillus tuberculosis should it be placed before him? How can he detect tyrosine or leucine in the urine, when he does not know a crystal from an air-bubble? How can he recognize structural disease of the kidney when he does not know a cast from an epithelial cell? These questions suggest their own answers. It might be said, possibly, that many of the older men now practicing medicine and doing so satisfactorily, and, indeed, with credit to themselves and the profession, never had laboratory instruction in these branches. This is true, but these men have been compelled to take up these new studies and methods for themselves. Besides, more is expected in these directions from the recent graduate than from the older man. Medical schools should always give the best and the most recent information, and every fact which may possibly aid in the diagnosis or treatment of disease should be made known to the student. The student has the right to expect and to demand this of teachers, and all intelligent and conscientious students will do so. The time once was when the teacher was a model from which his students copied. The student measured his own success by the extent to which he imitated his master. Now, that teacher who does not give his student opportunities for independent and original work in science is to a large extent a failure. Just as in the general progress of the race, one generation should be wiser than the preceding, so every class should contain one or more students who will at maturity be wiser than the best teacher.

I will presume that all of us here agree that laboratory instruction should be given in medical schools, and with this presumption I will now turn to the question of what, in kind and amount, should this laboratory teaching consist.

We will suppose that the student has had a full course in a good high school or an equivalent of this. (The best medical colleges are not satisfied with a less requirement for admission.) The student is able to use the English language correctly, and he has a good drill in mathematics, including arithmetic, algebra and plain geometry. He has had, we will suppose, fair instruction in systematic botany zoology. He is acquainted with the general classification of plants and animals, and knows the meaning of the general terms employed in the natural sciences. He has some knowledge of physics, knows what is meant by the conservation of energy, and understands the fundamental principles underlying our knowledge of heat, light and electricity. I am aware of the fact that many medical schools admit students who have not these qualifications, but such a school does not comply with the rules of this Association, and I am to discuss the question of laboratory teaching in those colleges which belong to this Association and which live up to the requirements to which we have mutually and voluntarily pledged ourselves.

In the first place it will be convenient to specify what I mean when I speak of the number of hours, days or weeks given to a subject. We will suppose that there are five teaching days in the week, that the forenoon of these days are devoted to class instruction given in the form of lectures and recitations, and that four hours of each afternoon are spent in laboratory work. In certain schools this order may be reversed or some of the laboratory instructions, practical anatomy, for instance, may be given in the evening. With the understanding then that four hours shall constitute a day of laboratory work, I will outline such a course as I conceive to be essential to the student.

The courses of laboratory work which should be embraced in the curriculum are, 1. Analytical chemistry; 2. Practical anatomy; 3. Bacteriology; 4. Physiological chemistry, including the analysis of urine; 5. Histology; 6. Physiology, and 7. Pathology.

1. *Analytical Chemistry.*—The medical student should become acquainted with the physical properties, solubilities and general reactions of the salts of silver, lead, mercury, copper, arsenic, antimony, bismuth, iron, zinc, cobalt, nickle, barium, calcium, potassium, sodium, lithium and ammonium, which are employed in medicine. This knowledge cannot be properly acquired from a study of books alone.

The student must see these compounds, must dissolve them, and must ascertain their incompatibles by precipitating the bases and acids with various reagents. To do this properly, experience has shown that a course of twelve weeks is required. If a shorter time is given to this branch the work must be done superficially and the knowledge is but imperfectly acquired.

2. *Practical Anatomy.*—Each student should first have a thorough drill in osteology. With the bones before him he must study their size and shape, the nature of their articulations, the points of origin and insertion of ligaments, tendons and muscles and the location of foramina. Then he should carefully, slowly, intelligently, under the eye of a demonstrator, dissect every part of the body, and in doing so he must not only study position, size and physiological office of each muscle, but of the viscera, the blood vessels and nerves. My observation has led me to believe that too often dissection means nothing more than a study of myology.

If the student is to become a surgeon it is quite as important that he should know what blood vessels and nerves are to be severed in a given operation as to know what muscles he must traverse with his knife. If he becomes a general practitioner he will need to recall the anatomy of the viscera more frequently than that of the muscles. Every medical school should also offer a course in surgical anatomy. Of course the professor of anatomy dissects before the class and gives especial attention to the hernial region and other parts of the body upon which surgical operations are often necessary; but this is not enough. Such knowledge as this is what our legal friends would designate as hearsay. The positive knowledge can be gained only by the student using the knife himself. Knowledge thus gained becomes a part of himself and arms him with a consciousness of his own resources when he is called upon to do the operation for the first time upon the living body.

The osteology should be taught during the first part of the first year. Then the courses in dissection may follow, while that in surgical anatomy is of most benefit when given later in the course and at times when the student is in attendance upon the surgical clinics.

I think that twenty week's time is none too long for the osteology and the dissections, while four weeks more might be given to the operative work.

Bacteriology.—Practical bacteriology is taught as an under-graduate course in only a very few medical schools, but this is not as it should be. The germ theory is now, and has been for some years, much more than a theory, and the causal relation of certain bacteria to certain infectious diseases has been demonstrated with all the certainty of direct scientific experimentation. We all teach that tuberculosis, diphtheria, typhoid fever, etc., are caused by bacteria; that the detection of these bacteria in many cases offers the only early means of positive diagnosis, and yet only a very few colleges afford any demonstrative instruction in this branch. Every sanitarian speaks of the spread of typhoid fever by contaminated drinking-water, and still of the hundreds of medical students graduated in this country within the past three months only a very small number have any conception of the method or procedure necessary to detect the typhoid germ. The surgeon dwells upon the fact that the pyogenic germs give rise to suppuration, and seldom demonstrates these organisms to his students. Great stress is placed upon the necessity of examining the sputum in suspected tuberculosis, and yet hundreds of graduates of the present year would not know how to stain the germ nor would they recognize it were it stained and placed before them. We teach that in many cases the recognition of Loffler bacillus is the only sure means of the postive recognition of diphtheria, and yet how many teachers make their students acquainted with the practical means of recognizing this organism. There is just cause of complaint on this point. Schools which neglect this branch of instruction are not giving their graduates the proper equipment.

A course of bacteriology embraces the methods of the preparation of the various culture media, of the processes of obtaining pure cultures, of the nature of growths on the various media, of the effect of pathogenic germs on animals, and of the detection and identification of the germs in tissue, in sputa, in drinking-water, and elsewhere. Such a course should begin with the study of the non-pathogenic and proceed to that of the pathogenic bacteria. I have tried the teaching of bacteriology in all the classes of a four year's course, and find that I can teach this subject to the students of the first year as satisfactorily as to those of the fourth year. Indeed, there is an advantage in having this instruction given early in the course. The student who has studied the diphtheria bacillus, or that of a tuberculosis, in the laboratory, and knows the manner of their growth, and has watched their effects upon animals, will listen to his clinical lectures upon these diseases with greater interest and more intelligence than the student whose only knowledge of these organisms is confined to that of their names with some imperfectly understood text-book or lecture description of them. Ten or twelve weeks should be given to the course.

4. *Physiological Chemisery.*—This course should

embrace a chemical study of the most important secretions of the body. The test for hydrochloric and lactic acids in vomited matters, the recognition of the digestive ferments and the method of the determination of the activity of the same, and an analysis of the urine and bile, should be included. The student should be made perfectly familiar with the constituents of normal urine. In most medical schools the analysis of urine is limited to the detection of sugar, albumen and bile. Students with such training often mistake epithelial scales for casts, and pronounce every reducing substance found in the urine, sugar. I meet with mistakes of this kind frequently, and have known more than one physician to lose the confidence and respect of the patient and his friends by mistaking an epithelial scale for a cast. A physician is often pardoned for overlooking a serious trouble when it exists, but it is a sad mistake to tell some man that he has an incurable form of Bright's disease or diabetes, when nothing of the kind exists. The patient gets over his fright after a while, but he is not likely to forgive the doctor who has made the blunder.

I believe that analysis of urine should form a part of clinical instruction, but this work should be preceded by a scientific study of normal urine and the scientific methods of estimating the most important normal and abnormal constituents of the urine. The course in physiological chemistry will occupy not less than ten or twelve weeks.

5. *Histology.*—The medical man certainly must be able to recognize the various tissues of the body by their microscopical appearance. He must be acquainted with the methods of hardening specimens, making sections, mounting and staining the same. This knowledge can not be acquired from books or in the lecture room. Laboratory instruction in this branch is a necessity. This knowledge can be gained in a course of six weeks.

6. *Physiology.*—All medical teachers admit the necessity of practical dissection in acquiring anatomical knowledge, while but few schools give practical courses in physiology. Notwithstanding this, it is certainly true that the medical man needs to employ his physiological knowledge quite as often as he does his anatomical learning. When such instruction is properly given we will have much more intelligence displayed in the practice of medicine. One needs to know the anatomy of the heart in order to detect valvular diseases of that organ, but the number of functional diseases of the heart which one is called upon to treat is certainly greater than that of structural diseases of the same organ, and yet the student in most of our schools has no practical instruction in the innervation of the circulating system. How many of us were able from knowledge gained in our undergraduate course to intelligently apply electricity to any part of the body, to mark out anæsthetic areas which would result from injury to or disease of any nerve, to intelligently interpret the reaction obtained in testing the knee reflex, to properly ascertain the degree of sensation in any muscle, to explain the relation between injury to the floor of the fourth ventricle and the glycogenic function of the liver: or in short, did we have any positive physiological knowledge other than a general idea of the processes of digestion, absorption and elimination? Do we not feel the want of this training in the work of every day? Should we not see to it that our students have this instruction? A six weeks' course in laboratory physiology will in my opinion be of great service.

7. *Pathology.*—The necessity of practical instruction in this branch will be admitted by all. Such a course should embrace both gross and minute pathology. The bungling way in which post-mortem examinations are often performed, and the little information which the medical man usually gets from such an examination, afford abundant evidence of the fact that gross pathology is too much neglected in our schools. Without microscopical pathology the determination of the nature of many growths is quite impossible. Let us give six weeks to the deadroom and laboratory courses in pathology.

To sum up I would say that the following laboratory courses are essential:

1. Analytical chemistry, 12 weeks.
2. Practical and surgical anatomy, 24 weeks.
3. Bacteriology, 10 to 12 weeks.
4. Physiological chemisty, 10 to 12 weeks.
5. Histology, 6 weeks.
6. Physiology, 6 weeks.
7. Pathology, 6 weeks.

This makes a minimum of 74 weeks. The greater part of this work should precede clinical instruction. Besides the above mentioned courses, therapeutics, including electro-theraputics, is now being taught in some schools largely by laboratory methods, and this tendency will grow.

Laboratory methods will soon largely modify clinical teaching. Amphitheatre clinics are giving way to bed-side and section instruction. Laparotomies and other capital operations are now made by the students in some of our schools on dogs. The surgeon as well as the chemist has his laboratory. The student delivers the alcohol baby from the rubber mother before he is permitted to enter the lying-in room. It is no longer necessary to spoil a hatful of human eyes before one becomes a skillful ophthalmologist.

DISCUSSION OF DR. VAUGHAN'S PAPER.

BY BAYARD HOLMES, B.S., M.D.,
SECRETARY COLLEGE OF PHYSICIANS AND SURGEONS, CHICAGO, ILL.

Mr. President and Gentlemen of the Association of Medical Colleges:—The paper of Dr. Vaughan, which has interested us so much, suggests great changes in medical education. During the past year my attention has been called to some of the details of laboratory work which must be faced by every one of you. Allow me to very briefly speak of some of the results of my thoughts and studies.

Laboratory rooms must be light and roomy. Forty square feet of floor is the least amount which will accommodate a single student, and then only in the chemical laboratory. In all other laboratories at least sixty square feet of floor space, not including aisles, must be allowed each student. In the chemical laboratory students' desks may be placed twenty feet from the windows; in laboratories in which microscopes are to be used, fourteen feet is a maximum.

The ordinary medical class in the larger institutions ranges from one hundred down to thirty, and therefore the laboratory room should be, if lighted on both sides, not less than fifty by forty feet, and it may be lengthened but not widened. At the institution which I represent, our laboratory rooms were

last winter twenty-five feet by sixty feet, lighted on one side and both ends; our largest class numbered ninety-four, and it was necessary, therefore, except in chemistry and bacteriology, to divide the class into two sections and then crowd them. Our new laboratories are attached directly to the old ones and are the same width (twenty-five feet), making each laboratory a room 160 feet long, lighted on one side and capable of accommodating eight students to each ten feet of length. This gives us, besides the necessary reduction for aisles and preparation rooms, accommodations for 120 students in each laboratory. This seems like a large class for laboratory work. So it is. And yet the fact that our laboratory teachers are practicing physicians makes it necessary to economize their time. They are unable to give the work the whole day, or every day in the week, and we believe, supposing an unlimited supply, that brick, stone, glass and iron are cheaper than men. This large laboratory class necessitates great and even elaborate system and unusually efficient teachers. Every man who can conduct a laboratory exercise creditably with a class of ten, will not be able to hold and instruct a class of seventy-five.

The order necessary requires such an arrangement of desks as will allow two sets of men to use each laboratory room. Our desks in the microscopical room have a flat surface $1\frac{1}{2}$ by $3\frac{1}{2}$ feet, of oiled white wood. There is a knee space two feet nearly, and two cupboards on the right, each locking with a Yale lock, and each eighteen inches square and two feet deep, in which are suitable drawers and shelves. The desks are built in pairs and the sides are stained white wood. Stools are provided that are about two inches higher than the ordinary chair and can be placed in the knee space when not in use.

These details may be tiresome, but success in the laboratory work depends on the care with which these details are considered. One of the most important matters is the system of bookkeeping employed by the curator in keeping track of the supplies. We lost at least two thousand dollars unnecessarily from the neglect of this business-like forethought. Last term we started out with a single man for curator. The demonstrators furnished lists of material required for each of the nine laboratory courses which were conducted last term. A sufficient number of outfits were made up by the curator a month before the term opened. On an appointed hour the students selected their desks in the laboratory in the order in which they purchased their tickets. They went one by one to the store-room as their places were assigned and received each his outfit. In the outfit were two printed lists of the material contained. Each student compared his invoice with the outfit, signed the receipt on one invoice, left it with the curator, and after locking the desk put his key in his pocket and went out in an orderly manner. These receipted invoices were entered in a book which had two columns opposite each student's name, one for debits, one for credits, and a place for the student to sign his name on receiving his balance and closing the account. Students are encouraged to keep their outfits, as they are useful in promoting after study. They are paid for at cost, or a little above cost, out of a deposit fund placed with the treasurer for that purpose. By such a system the laboratories may be made a source of income, and not an expense to the college.

The equipment and supplies are purchased for the most part in Europe, on account of the enormous reduction which the law allows educational institutions in the rebate in imposts. It is necessary to put in all orders for European goods at least as early

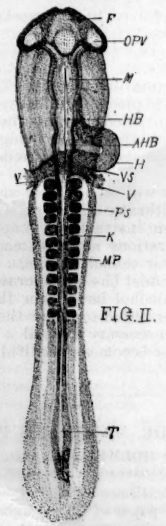


FIG. II.

The Normal Embryo.

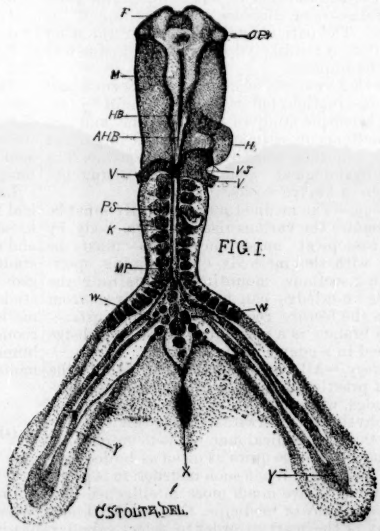
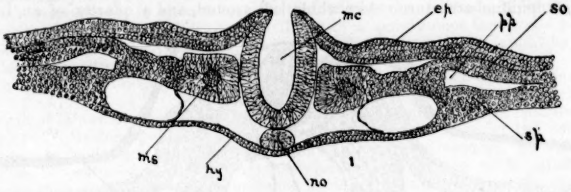


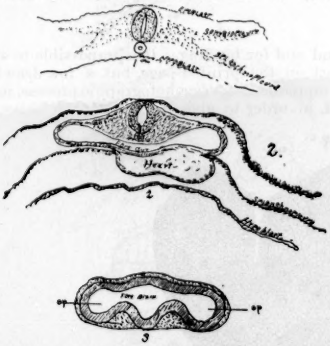
FIG. I.

The Fissioned Embryo.

as March 1. In our laboratories we are using the Leitz and the Bausch and Lomb microscopes. We have now a sufficient number to give each man an instrument. We urge students to provide themselves with microscopes, and many of them do, especially the second year.

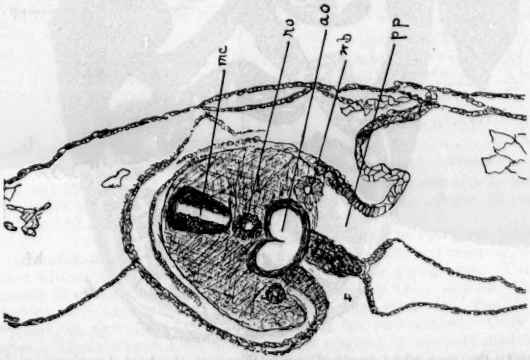
If I may be allowed the time, I should like to show you some drawings made last winter by second year men in the College of Physicians and Surgeons, in the laboratory of Dr. A. P. Ohlmacher, Professor of Embryology and Biology. These 250 or more drawings represent the work of *every one* of the class of seventy-two students, and they were a part of the final examinations on that branch. Under the directions of Prof. Ohlmacher and his two assistants, Mr. Stolts and Mr. Osincup, selected out of the class, each student opened his incubated egg, sketched and removed his embryo, fixed, stained, imbedded, cut and mounted it. He made drawings representing the different portions, and was quizzed on the drawings and the specimens under the microscope.





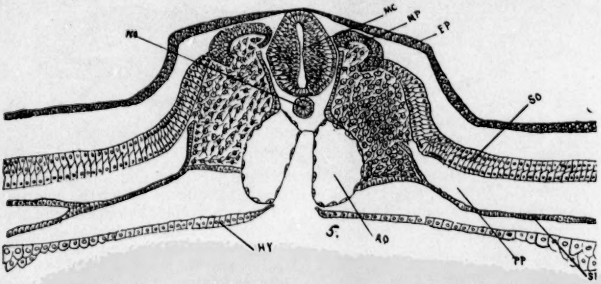
You will notice that in spite of the fact that there is a general impression among students that some cannot draw, there is not one disgraceful drawing in the lot, and there are at least two or three drawings from each student in a class of seventy-two. The class only studied the first four days of the embryo's development, so you will recognize all the parts.

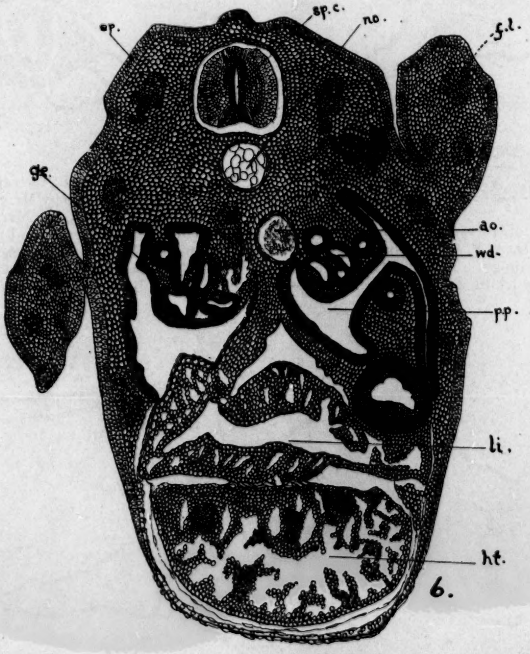
Let me call your attention especially to the drawing of the whole embryo by Mr. Stoltz. Each student made a sketch like this, but Mr. Stoltz, in examining a large number of eggs, found one with an error of development which he has described in full in the *Scalpel*, the magazine published by the students of the college. Both drawings are reproduced here to show the best free-hand drawing, without the use of a camera lucida or other projection device.



Perhaps the only original departure made by the

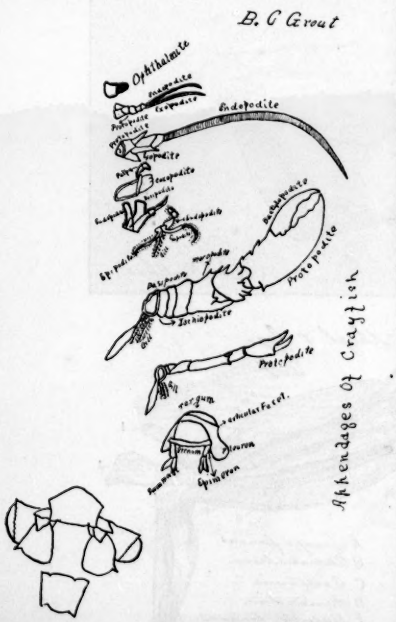
College of Physicians and Surgeons during the past year has been in the introduction of an extended course in Biology. This course really covers a course in comparative anatomy, a course in elementary physiology, and a course in the histological study of the elements of mammalian structure. As a whole, the course occupies ten hours a week, and has been most successfully conducted by Prof. Ohlmacher. If it will not tire you too much, allow me to show you some 300 drawings made during the present spring term by a class of twenty-two men who have just begun the study. The complete work of each man, as far as has been required, is before you. You will notice a greater difference in the mechanical execution here than in the embryology. The drawings in all the laboratories are made on paper furnished at cost by the College. It is of uniform size, 11 by 8½ inches, or 8½ by 5½ inches. The drawings occupy a definite portion of the sheet, leaving a margin of one inch all around, and a quarter of an inch more on the left hand end for binding. It is impossible to show this work on the printed page, but a few drawings will be reproduced by the photographic process, much reduced, in order to give a faint idea of the work. Some of the best drawings are in colors and cannot be reproduced at all, others are too fine to stand reduction, and others have some shading which would require too expensive a method of reproduction.





Dr. Vaughan has given me one idea which is new, and that is of the position of bacteriology in the course. This branch has been placed in our schools in the third year, on account of its intimate connection with medicine and surgery, which fills the fourth year. There seems no reason why it should not appear earlier in the course. Systematic bacteriology could certainly be placed in the second year. Still, I believe that its value to the student would be increased by associating it with pathological study as we have done.

In regard to the length of laboratory hours, several points must be considered. Microscopical laboratories cannot conflict, because we do not have enough microscopes to equip two laboratories at once. Our men cannot spare more than three hours at a time out of their practice, and therefore it has been found

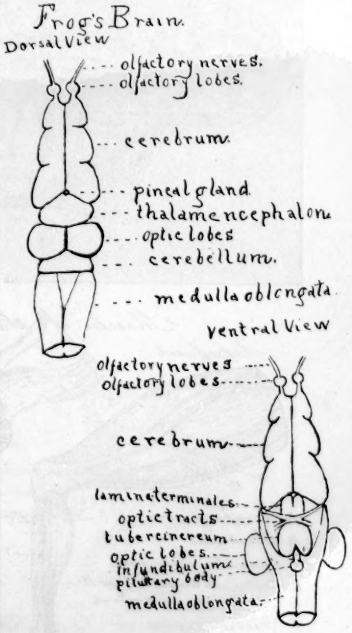


necessary with us to make the length of each laboratory exercise two hours. There is no doubt that, had we the entire time of our laboratory teachers at our disposal, it would be better to make the unit of the laboratory exercise three or four hours, as the essayist has suggested.

On account of the necessity of one laboratory exercise following another without intermission, and on account of the necessity of some preparation in each laboratory room before each exercise, we have concluded that it is necessary to provide *at least* two microscopical laboratories. This we have done, and you will see by the time card how our exercises follow one another, and what portion of the student's time in each year's work is occupied in lectures and recitations, in laboratory work and in clinics.

The introduction of laboratory work gives a new impetus to medical education in small cities. The work in this department can be done better, other things being equal, in small medical schools. I predict that these medical schools in small cities that adopt vigorous methods of laboratory teaching will rise to a prominence they could never have attained while medicine was taught by lectures and clinics alone.

The laboratory teaching will also make a change in the character of medical students. The farmer or butcher medical student cannot hold his knees fifteen or twenty hours a week under the laboratory table throughout a four-year course. He will give place to the educated young men of 20, graduated now in such astounding numbers from the multiplying colleges all over the country, but especially the Central

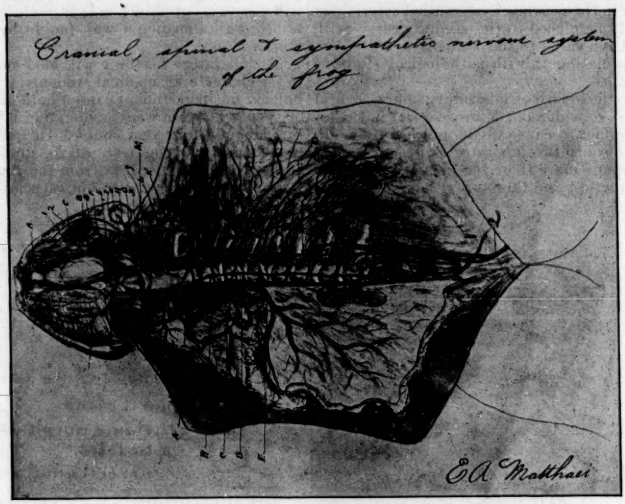


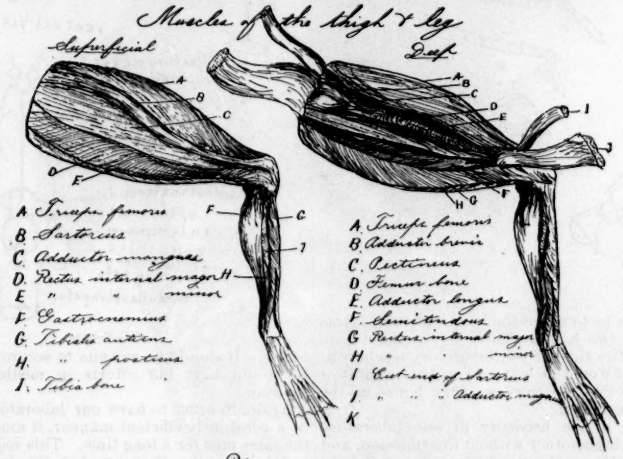
J. C. Reming.

States. It should be our aim to secure these men, if we would have our efforts in medical education succeed.

Again, in order to have our laboratory work done in a constantly efficient manner, it must be done by the same men for a long time. This requires money, and more money than any but the largest schools can obtain from students. That is to say, laboratory work calls for endowment. Only a few State Universities pretend to support medical schools, and so far as I know only one of these, Minnesota, contributes liberally to the annual expenses of the medical department. It seems strange that the department of the university, which should in this country fur-

nish one-fourth of the entire enrollment, should not have received even 2 per cent. of the endowment. It should be the concerted effort of this Association to educate the generous public to a thorough understanding of our deserts and our needs.



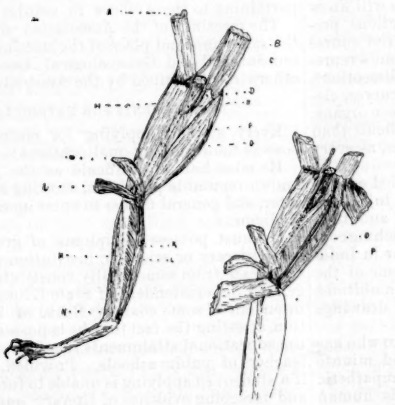


The accompanying figures, numbered 1, 2, 3, 4, 5 and 6, represent reproductions of embryological drawings by several of the students in the class. They are all drawings of cross sections of embryo chicks of various stages of development. These drawings were made on the paper described in India ink, being copies of the class-room drawings which were first made in a note book with lead pencil. No text-book was used in the work of embryology, the work being guided by a few printed syllabi and by oral instruction. Hence the student had no illustration of the object he studied, save the picture his mind conceived. We may, therefore, take these drawings as represent-

ing the student's individual conception. The lettering of the various parts is made uniform only for the sake of easy comparison.

Fig. 1 was drawn by Mr. J. F. Adams from a section of the tail end of a 36-hours chick. It shows very clearly the primitive germinal layers, splitting of the mesoblast, mesoblastic somites, notochord and medullary canal not completely closed. Fig. 2 represents three drawings by Mr. O. B. Monosmith, showing a section through the tail end, one through the heart region and one through the fore brain of a 36-hours chick, all from the same embryo. Fig. 3, from an embryo of about 50 hours incubation, by A. M. Fulton. Fig. 4 shows the amniotic folds and amniotic cavity very clearly, and was drawn by Mr. G. A. Hibbert. Fig. 5 is from a section through the hind end of a 3-days chick, by Mr. R. H. Herrold. Fig. 6 was drawn from a section of a 5-days chick, by Mr. J. J. Pierron, and shows the budding of the fore limbs, the development of the heart, liver, urogenital system, etc.

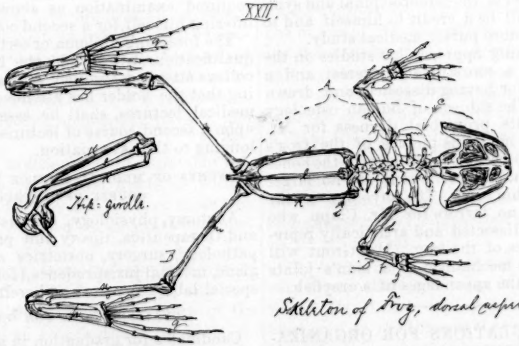
Leg Muscles.



A Ext end of Sartorius
B .. .. Adductor Magnus
C .. .. Longus
D .. Adductor Brevis
E .. Pectineus
F .. Rectus Internus Major
G .. .. .. Minor
H .. Triceps Femoris
I .. Inner end Adductor Magnus.
L .. .. Sartorius.
K. Gastrocnemius
L. Tibialis Posticus
M Peroneus
N. Anticus Brevis.
O. Semi. Tendinosus
P. Semi. Membranosus

H. D. Clapp.

XVII.



Skeleton of Frog, dorsal aspect

A. axial, B. appendicular skeleton. - a. head, b. vertebræ (9) c. shoulder girdle, d. humerus, e. radius, f. ulna, g. carpus, h. digits. i, 9th vertebra or sacrum, k. hip girdle or pelvic arch, l. urostyle, m. femur, n. tibia, o. fibula, p, tarsus, q. digites.

F. L. Mueller, May 1892.

To anyone who has had experience in this kind of work it must be evident that many hours of painstaking labor have been spent in producing some of these drawings.

The few drawings of the spring class in biology here reproduced speak for themselves. They are copies of note book drawings made by the student as he dissected the animal chosen. Huxley and Martin's Practical Biology was used as a guide in the work on the crayfish and frog, and one familiar with this most valuable laboratory guide will know that it contains no figures of the dissections prescribed. Therefore, in this work, as in the course in embryology, the drawings are the student's representation of what he saw as he made his dissections. Moreover, this work of reproducing the curves, elevations and depressions, distinctions between organs, etc., of the *whole object*, is much more difficult than the reproduction of microscopical sections, as every scientific draughtsman knows.

In the biological class each student caried out his own work. He made all the dissections, injections and other preparations required, himself, and then made a drawing of the completed work which he copied on the sheets of paper furnished, either in India ink or in color. It will be noted that some of the work is plain outline drawing, while more ambitious students have shaded and colored their drawings most artistically.

Is it not reasonable to presume that a man who has dissected and verified all the intricate and minute relations of the cerebro-spinal and sympathetic nervous systems of the frog will go to his human subject with a determination of carrying out equally exacting studies? We believe that a student who has by his own labor produced such a drawing as that made by Mr. Matthaei of the cerebro-spinal and sympathetic systems, will be a credit to himself and to his teachers in any more purely medical study.

Will not Mr. Fleming approach his studies on the human brain with a more lively interest and a broader foundation for having dissected and drawn this frog's brain? The subject of human osteology will lose some of its proverbial dryness for Mr. Mueller since he has made his picture of the frog's skeleton and since he became familiar with the bones of the frog's cranium, some of which are no larger than the letters of this type. The myology of the human leg will have no terrors for Mr. Clapp who has so scientifically dissected and artistically represented the leg muscles of the frog. Mr. Grout will better appreciate the mechanism of a man's joints from having studied the appendages of a crayfish.

RULES AND REGULATIONS FOR ORGANIZATION AND MAINTENANCE OF THE SOUTHERN MEDICAL COLLEGE ASSOCIATION.

This Association shall be composed of delegates from Southern Medical Colleges, whose Faculties have signified a desire to become members thereof, signed these rules of organization, and paid the membership fee of $5.00.

The objects of the Association are to cultivate closer and more intimate relation between medical colleges and to elevate the standard of medical education by requiring a more thorough preliminary training and an increased length of medical study.

The Association shall be composed of one or more from each Medical College, belonging thereto, who shall be elected annually by their respective faculties. Each college shall be entitled to one vote in the transactions of the Association.

The officers shall consist of a President, Vice-President, Secretary and Treasurer, who shall be elected annually, just before the adjournment of the annual meetings, and shall perform the respective duties, pertaining to these offices in similar organizations.

The meetings of the Association shall be held at the same time and place of the meetings of the Southern Surgical and Gynecological Association, unless otherwise determined by the Association.

REQUIREMENTS FOR MATRICULATION.

Every student applying for matriculation must possess the following qualifications:

He must hold a certificate as the pupil of some known reputable physician, showing his moral character, and general fitness to enter upon the study of medicine.

He must possess a diploma of graduation from some literary or scientific institution of learning, or certificate from some legally constituted high school, general Superintendent of State Education or Superintendent of some country Board of Public Education, attesting the fact that he is possessed of at least the educational attainments required of second grade teachers of public schools. Provided, however, that if a student so applying is unable to furnish the above and foregoing evidence of literary qualifications, he may be permitted to matriculate and receive medical instructions as other students, and qualify himself in the required literary departments, and stand his required examination as above specified, prior to offering himself for a second course of lectures.

The foregoing diploma or certificate of educational qualifications, attested by the Dean of the medical college attended, together with a set of tickets showing that the holder has attended one full course of medical lectures, shall be essential to attendance upon a second course of lectures in any college belonging to this Association.

BRANCHES OF MEDICAL SCIENCE TO BE INCLUDED IN COURSE OF INSTRUCTIONS.

Anatomy, physiology, chemistry, materia medica and therapeutics, theory and practice of medicine, pathology, surgery, obstetrics and gynecology, hygiene, medical jurisprudence,(forensic medicine)and special laboratory work as hereinafter provided.

QUALIFICATIONS FOR GRADUATION.

Candidates for graduation in addition to the usual requirements of medical colleges, must have attended three courses of lectures of not less than six months each in three separate years;

Must have dissected in two courses, and attended two courses of clinical or hospital instructions,

And must have attended one course in each of the special laboratory departments to-wit: 1. Histology and bacteriology. 2. Chemistry. 3. Operative surgery.

These requirements shall not apply to any student who has received a course of medical lectures prior to September 1, 1893.

M. T. BRIGGS,
J. B. MARVIN,
J. S. CAIN, Com'tee.

THE
Journal of the American Medical Association
PUBLISHED WEEKLY.

SUBSCRIPTION PRICE, INCLUDING POSTAGE:
PER ANNUM, IN ADVANCE $5.00
SINGLE COPIES . . . . . 10 CENTS.

Subscriptions may begin at any time and be sent to
THE JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION,
No. 68 WABASH AVE., CHICAGO, ILLINOIS.

All members of the Association should send their Annual Dues to the Treasurer, RICHARD J. DUNGLISON, M.D., Lock Box 1274, Philadelphia, Pa.

MEMBERSHIP IN THE AMERICAN MEDICAL ASSOCIATION.

This is obtainable, at any time, by a member of any State or local Medical Society which is entitled to send delegates to the Association. All that is necessary is for the applicant to write to the Treasurer of the Association, Dr. Richard J. Dunglison, Lock Box 1274, Philadelphia, Pa., sending him a certificate or statement that he is in good standing in his own Society, signed by the President and Secretary of said Society, with five dollars for annual dues and subscription for THE JOURNAL. Attendance as a delegate at an annual meeting of the Association is not necessary to obtain membership. On receipt of the above amount the weekly JOURNAL of the Association will be forwarded regularly.

SATURDAY, DECEMBER 3, 1892.

ORDINANCES OF THE AMERICAM MEDICAL ASSOCIATION.

The following preamble and resolution, adopted at the last meeting of the Association, should have been appended to those published in the issue of THE JOURNAL of November 19.

The action of the American Medical College Association at the meeting referred to by this resolution will be found on page 664 of this issue of THE JOURNAL.

WHEREAS, The Association of American Medical Colleges has adopted the following regulations, viz.: Article III of the Constitution.

§ 1. Members of this Association shall require of all matriculates an English composition in the handwriting of the applicant of not less than two hundred words, an examination by a Committee of the Faculty, or other lawfully constituted Board of Examiners, in higher arithmetic, algebra, elementary physics and Latin prose.

§ 2. Graduates or matriculates of reputable colleges, or high schools of the first grade, or normal schools established by State authority, or those who may have successfully passed the entrance examination provided by the statutes of the State of New York, shall be exempt from the requirements of Section 1.

§ 3. Students conditioned in one or more of the branches enumerated as requirements for matriculation, shall have time until the beginning of the second year to make up such deficiencies, provided, however, that students who fail in any of the required branches in this second examination shall not be admitted to a second course.

§ 4. Colleges granting final examination on elementary subjects to junior students, shall not issue certificates of such final examination, nor shall any member of this Association confer the degree of Doctor of Medicine upon any person who has not been first examined upon all the branches of the curriculum by the faculty of the College granting the degree.

§ 5. Candidates for the degree of Doctor of Medicine shall have attended three courses of graded instruction, of not less than six months each, in three separate years.

§ 6. Students who have matriculated in any regular medical college prior to July 1, 1892, shall be exempted from these requirements.

Resolved, therefore, That the American Medical Association most heartily endorses the efforts of the Association of American Medical Colleges to advance the cause of medical education, and demands of the medical colleges of the United States the adoption and observance of a standard of requirement which shall in no respect fall below the minimum standard of requirements adopted by the said college association.

SYMPHYSIOTOMY IN THE UNITED STATES.

A brief item on page 604 of the current volume of THE JOURNAL referred to the first recorded symphysiotomy in this country. The date of this operation was not there stated, but it was September 30, 1892. A second operation followed sharply after on October 3, in the University Maternity at Philadelphia. The obstetric surgeon in this second case was DR. BARTON COOKE HURST, who had the assistance and advice of DRS. NORRIS and HARRIS. The report of the case has appeared in the *Maryland Medical Journal* for October 29. The mother and child did well. The union of the symphysis took place promptly, and three weeks after the operation the mother was walking about the house as well and firmly as ever.

The patient was a primipara in this case as well as in the case of DR. JEWETT of Brooklyn (the first one), and the child of each was born living: unfortunately in the case of DR. JEWETT'S infant death took place about twenty-four hours after birth, from the prolonged compression to which its head had been subjected by its impaction in the contracted pelvis of the mother.

The technique of symphysiotomy will, under ordinary circumstances, be easy and void of complications. DR. HURST employed the curved knife Galbiati, one of the three at that time in the country. He at first thought that he would make the section of the symphysis with an ordinary probe-pointed,curved bistoury but he was glad to lay it aside and take up the Galbiati blade. In regard to the use of forceps in the delivery of the child, Dr. Hurst holds that it is not necessary to lay down any hard and fast rule —each case should be taken on its own merits and indications—but he will probably rely upon the forceps in his future cases as he did in his first one.

We judge that this operation has been properly re-introduced to the notice of the American profes-

sion and will receive a fair trial especially in our lying-in wards and hospitals.

NEW FORM OF IODINE TREATMENT FOR TUBERCULOSIS.

DR. RENZI has given, in the *Revista Clinica e Therapeutica*, some facts regarding his new method of employing iodine in phthisical cases. His formula prescribes the use of iodine one part, iodide of potassium, three parts, chloride of sodium, six parts, and distilled water 1000 parts. He injected this solution into the ear-vein of healthy, and also diseased rabbits, and into the subcutaneous tissue of rabbits, guinea-pigs and dogs. Having in this manner carefully established the complete tolerance of the compound, he began to give it to his phthisical patients. Hypodermatic dosage was first tried with them, as much as 100 grains having been thus given. This method was not well borne, and the remedy was next tried by the mouth, the dose being from 500 to 550 grains. Nineteen patients, nearly all of them with advanced phthisis, were thus treated. Symptoms of iodism were produced in some patients, but did not persist long after a discontinuance of the doses. In all these persons there was an increase of appetite and of body-weight. There was an increased flow of urine, the temperature was brought down to normal, and the number of bacilli in the sputa was diminished. The writer believes that the results obtained from this plan of using iodine will compare favorably with those of any of the other treatments that are at present in vogue.

HEIDENHAIN'S MICRO-TECHNIQUE.

The course of science is from the simple to the complex; and then again, the extension of science depends upon the adoption of the simpler for more intricate and complex tools and methods. Histology and pathology advanced with the perfection of the microscope and then rested until the microtome gave them a new impulse. We hear no longer of microscopists, but of microtomists.

The new impulse which FLEMMING and ALTMAN have given microtomy depends upon more perfect and successful methods of fixation and staining. These methods have been too difficult and the materials too unstable to permit of their general use. It is, therefore, with satisfaction that we read in the *Medical News*, of November 19, OHLMACHER'S recommendation of the simpler method of HEIDENHAIN.

This method is especially adapted to operators and physicians. The perfectly fresh tissue is cut in cubes no more than three-eighths of an inch square. It is fixed in a supersaturated solution of corrosive sublimate in water containing one-half per cent. of common salt. It must remain in this solution not more than an hour. It is dehydrated in 95 per cent. alcohol in the usual manner. Care must be taken not to leave it many days in alcohol as the tissue becomes too brittle to cut. It is imbedded in the usual manner and may be thus kept any length of time. The crystals of sublimate are removed from the sections on the slide by means of the tincture of iodine. This is again removed with alcohol. Any method of staining may be used.

Should this method be adopted in this country the author predicts great advance in the value of our histological and pathological studies.

PRIVATE ASYLUM FOR THE TREATMENT OF NEUROTIC DISEASE.

The rapid increase of the number of private asylums in this country, indicates a revolution in the methods of treatment. Dependence on locks and bars, and chemical restraint by drugs is giving away to surroundings and hygienic measures, adapted to suit the wants of each individual case. In England all private asylums for the insane and feeble-minded, are registered and under the control of the commissions of lunacy, who visit them, and require that they keep a record of all cases. In this country no public oversight is exercised, and the number and variety of such places depend on commercial wants and conditions, as interpreted by the owners and managers. The lunacy report of Great Britain for 1891, shows that the number of these asylums are eighty-six, and the number of patients is steadily increasing. For 1891 this increase was one hundred and eighteen patients. The suicides and injuries reported are much less than in other asylums, and the commissioners report that their management has been very satisfactory. In this country there are about fifty such asylums, including reputable sanitariums, or places under the control of regular physicians. Most of these are in New England and the Middle States and are managed by physicians who have had experience in public asylums as superintendents or assistants. Very little is known of their condition or management outside of the reputation of the managing physician. This is the only guide the profession has, and fortunately in most cases the physicians in charge recognize this, and use every means to stand well before the profession. As a rule, this class appeals to the medical public through its papers and discussions of the special topic of its work. There is another class whose extravagant pretensions and assumed results of treatment, with laudations of their means and methods, and superiority to others, are open to some suspicion. Extravagant advertisements, with circulars that have a familiar commercial ring that sounds unpleasant in scientific circles, are not uncommon to this class. A third class of asylums are managed by persons who are unknown to the pro-

fession, and who have no record or standing in the medical directories. Coming up suddenly from the unknown, they rely entirely on pretensions, and sooner or later disappear under a cloud of wrong doing. The pecuniary rewards of this field of medicine are less than in general practice, but the labor and exposure is also less, and the real scientific man has more time for study and reflection.

Nearly all the physicians in charge of such places have acquired a fascination for this field of labor in public institutions, and find it difficult to settle down to private practice, hence are compelled to take up this work. Others have a false impression that this is an ideal work, free from cares and labor, and rush into it only to be disappointed and drop out. The number of new asylums each year, and the number that die out and disappear, show that here as elsewhere, the "survival of the fittest" takes place. These places managed by good men, are supplying an increasing want that is becoming daily more apparent. These institutions should come under some control, or State supervision, and be registered and required to report their work; to submit to inspection, and come under some general rule of management and conduct. Then the medical public could have some guide and assurance, that all patients placed in them would receive rational and scientific care and treatment.

At present physicians wishing to place patients in private asylums, must make personal inspection of them or trust to circulars and statements before they can decide. If he has an inebriate patient, the number of empiric institutions that will claim to make a cure, will be bewildering. All this is wrong; while every physician has a right to open his house for the treatment and cure of his own private patients, when he extends the circle of his practice and receives strangers, he owes it to the public to come under some general supervision and make his means and methods known. The public demands that any one who receives sick and incompetent persons for treatment, should have some degree of capacity, both in scientific skill and surroundings to do this work. Private asylums have become a permanent necessity, but their value and usefulness are seriously periled by the empiric rivals who are starting up in every direction. A crusade against the quack asylums is a new field for reform, anxiously waiting for some pioneer to lead astruggle for the holy grail.

EDITORIAL NOTES.

THREE TEMPERANCE BEVERAGES.—From an English journal we copy the following suggestions for non-alcoholic drinks:

"Stokos is prepared thus: Put from 4 to 6 ounces of fresh oatmeal, ground as fine as flour, into a pan, mix with a little cold water to the substance of cream, then add 5 or 6 oz. of loaf sugar and a fresh lemon cut in thin slices with the pips taken out; add a gallon of boiling water. Stir thoroughly while the water is being poured on. Use hot, warm or cold. The lemon may be omitted or any other flavoring used instead. Costs 3d. a gallon, or five gallons 1s.; four lemons are enough for five gallons.

"Cokos is a good nourishing drink, made as follows: Put 4 oz. of fresh fine ground oatmeal, 4 oz. of cocoa, into a pan mixed with a little cold water into a thin batter, then add 6 oz. of sugar, pour on a gallon of boiling water (stir while water is being added). Take to the field in a stone jar. Costs 4d. a gallon.

"Hopkos is a good harvest drink: Boil ½ oz. of hops and ½ oz. of ginger (bruised) in 1½ gallons of water for 25 minutes; add 1 lb. of best brown sugar, and boil 10 minutes more; then strain and bottle, or put into a cask while hot; it will be ready for drinking when cold. It should be kept in a cold place. Dried horehound may be used instead of hops. Costs 3d. a gallon."

The inventor of "stokos, cokos and hopkos" is Mr. John Abbey, of Norwich, who says they have become quite popular with the crop-gatherers of 1892.

THE "ONE HUNDRED DAY" DISEASE.—Dr. Alice M. Ross, of Swatow, writes in the *Reporter*, October 8, that whooping cough goes by the name of the "hundred day disease" in Japan. That is a term that tallies fairly well with our own average prognosis, if we except those fortunate cases that are amenable to antipyrin or exalgine.

HOSPITAL NURSING IN PARIS.—M. Laurent, of the Municipal Council, of Paris, is quoted by *The Lancet* as saying that the wages paid for nursing at the hospitals are altogether too small to attract the services of suitable persons. Those who become nurses are either saintly heroines or they are wrecks of humanity who cannot find employment anywhere else.

THE "MEDICAL PRESS AND CIRCULAR."—This ever welcome London periodical, in its issue of November 2, states that a libel suit has recently been entered by the cancer-curer, Count Mattei. This is the second suit of the kind—the first having been that of our fellow citizen, Keeley—that has been thrust upon *The Press and Circular* by men outside the pale of rational medicine. In an editorial entitled "The Dangers of Honest Journalism," the writer regrets that the costs should be so heavy as they are, but he feels confident that these financial wounds will be healed by the approbation and support of the journal-reading part of the profession. But whether that shall be so or not, the editor proposes to keep his anti-quackery colors flying, claiming to be "the only British journal that is obnoxious to shams, and that has the courage to expose them." One other note-worthy point about this journal is the fact that it is not overloaded with a mass of indifferent material and does not cumber up one's desk and shelf room as do the larger and the so-called "great uncut" journals. We wish *The Press* a happy issue out of its present and impending prosecutions.

BOOK REVIEWS.

THE STUDENT'S QUIZ SERIES. PRACTICE OF MEDICINE. A manual for students and practitioners by EDWIN T. DOUBLEDAY, M.D., and J. DARWIN NAGEL, M.D. Philadelphia: Lea Brothers & Co.

This is an excellent little manual, arranged like its fellows in the form of questions and answers. It is based largely upon the works of Fagge, Niemeyer, Bennett, Flint, Delafield and Gowers. While we have heretofore expressed doubts as to the value of works of this sort, yet we can confidently recommend this work as one of the best of its kind. Especially do we commend that portion dealing with nervous diseases.

MISCELLANY.

DR. JOHN RIDLON has been appointed Professor of Orthopedic Surgery in the Post-Graduate Medical School of Chicago.

THE Messrs MacMillan & Co. announce that the recently completed edition of Foster's Text-Book of Physiology in four parts is to be supplemented by the issue of an appendix on "The Chemical Basis of the Animal Body," by A. Sheridan Lea, Sc.D., F.R.S.

NORTH CENTRAL ILLINOIS MEDICAL ASSOCIATION.—The nineteenth annual meeting of this Association will be held in the City Hall, Mendota, Ill., on Tuesday and Wednesday, December 6 and 7, 1892. The following is the general program:

Bacteriology, J. W. Edwards, M.D., Mendota. Discussion: H. Ziesing, M.D., Peru; T. W. Burrows, M.D., Serena.

Actinomycosis, T. C. Fenton, M.D., Streator. Discussion: B. S. Roseberry, M.D., Lacon; G. A. Dicus, M.D., Streator.

Nasal Polypus, L. G. Thompson, M.D., Lacon. Discussion: J. H. Coulter, M.D., Chicago; A. E. Owens, M.D., Princeton.

Some Clinical Experience in the Treatment of Diphtheria, Harriet E. Garrison, M.D., Dixon. Discussion: E. T. Goble, M.D., Earlville; C. E. Davis, M.D., Peoria.

Diphtheria and Its Treatment, C. D. Chalfant, M.D., Streator. Discussion: L. R. Burns, M.D., LaSalle; Jas. Tweddale, M.D., Washburn.

My Symptoms, Feelings and Impressions During an Attack of Metastatic Rheumatism of the Meninges of the Brain, J. S. Whitmire, M.D., Metamora. Discussion: J. C. Hathaway, M.D., Ottawa; T. H. Stetler, M.D., Paw Paw.

The Relations of Physicians with County Coroners, E. J. Carroll, M.D., Somonauk. Discussion: J. T. Milling, M.D., Peru; W. A. Mansfield, M.D., Metamora.

Typhoid Fever, J. Stout, M.D., Ottawa. Discussion: J. D. Scouller, M.D., Pontiac; F. M. Pendleton, M.D., Magnolia.

Our Present Knowledge of Epilepsy, R. Hemala, M.D., Onarga. Discussion: J. W. Pettit, M.D., Ottawa; C. E. Fogg, M.D., Lowell.

Tenotomy in Antero-Lateral Spinal Sclerosis, J. A. Freeman, M.D., Millington. Discussion: G. A. Zeller, M.D., Peoria; I. H. Reeder, M.D., Lacon.

Therapeutical Uses of the Coal Tar Preparations, F. C. Robinson, M.D., Maywood. Discussion: G. F. Schreiber, M.D., Wyanet; D. S. Jenks, M.D., Plano.

Volunteer Papers.

THE S. D. GROSS PROFESSORSHIP OF PATHOLOGICAL ANATOMY FUND.—The Committee appointed by the General Committee to audit the account of Dr. Richard J. Dunglison, Treasurer of the S. D. Gross Prosessorship Fund of the Alumni Association of Jefferson Medical College, respectfully report that after an examination of such account they find that there were sixty contributors to the fund, the total amount contributed being $3,499.00. In accordance with a resolution of the General Committee these contributions have all been returned to the donors, and the Treasurer has presented a voucher for each amount thus refunded. A great portion of the whole amount has been retained undistributed until recently, so that the interest on the amount might so accumulate as to enable the Committee to refund to each subscriber the full amount of his contribution, without any deduction for expenses of publication of circulars, postage, etc., which were necessarily heavy, from the widespread diffusion given the objects of the Fund.

The names and addresses of the subscribers and the amounts contributed by them are as follows:

Dr. S. D. Gross, Philadelphia, Pa	$1,000 00
" J. Marion Sims, New York, N. Y	500 00
W. L. Conyngham, Wilkes-Barre, Pa	200 00
Dr. Hunter McGuire, Richmond, Va	125 00
" Joseph Hearn, Philadelphia, Pa	100 00
" Albert H. Smith, Philadelphia, Pa	100 00
" N. Bozeman, New York, N. Y	100 00
Henry C. Lea, Philadelphia, Pa	100 00
Dr. T. Addis Emmet, New York, N. Y	100 00
" N. Senn (Collections) Milwaukee, Wis	63 00
" J. B. Weever, Mount Vernon, Ind	50 00
	$2,438 00

Brought forward	$2,438 00
Dr. J. M. Barton, Philadelphia, Pa	50 00
" P. S. Conner, Cincinnati, O	50 00
Mrs. Elizabeth Casey, Ballston Springs, N. Y	50 00
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" J. Solis-Cohen, Philadelphia, Pa	50 00
" J. W. Holland, Philadelphia, Pa	50 00
" L. D. Wilson (Collections) Wheeling, W. Va	45 00
" Dr. R. Battey, Rome, Ga	25 00
David H. Lane, Philadelphia, Pa	25 00
Dr. C. E. Kamerly, Philadelphia, Pa	25 00
" W. L. Kneedler, U. S. Army	25 00
Camden (N. J.) Medical Society	25 00
Dr. Richard J. Dunglison, Philadelphia, Pa	25 00
" T. H. E. Gruel, Philadelphia, Pa	25 00
" James Graham, Philadelphia, Pa	25 00
" C. A. Siegfried, U. S. Navy	25 00
" C. Wirgman, Philadelphia, Pa	20 00
" E. Phillips, New Haven, Pa	20 00
" R. T. Coleman, Richmond, Va	20 00
" J. B. Ferguson, Fort Sisseton, Dak	20 00
" H. N. Young, Chicago, Ill	20 00
" J. R. Weist, Richmond, Ind	20 00
Persifor Frazier, Philadelphia, Pa	20 00
Dr. D. W. Cheever, Boston, Mass	20 00
" B. A. Watson, Jersey City, N. J	20 00
" H. Fritsch, Philadelphia, Pa	20 00
" John Graham, Philadelphia, Pa	20 00
" R. A. Kinloch (Collections) Charleston, S. C	15 00
" C. Lester Hall, Marshall, Mo	10 00
" John H. Day, Walla Walla, Wash	10 00
" W. Ashbridge, Philadelphia, Pa	10 00
" J. L. Sweet, Newport, N. H	10 00
" E. Grissom, Raleigh, N. C	10 00
" W. L. Richardson, Montrose, Pa	10 00
" W. W. Nye, Hiawatha, Kan	5 00
" J. H. Mackie, New Bedford, Mass	5 00
" R. S. Wallace, East Brady, Pa	5 00
" B. B. Lenoir, Lenoir's, Tenn	5 00
" I. E. Clark, Moravia, Tex	5 00
" Otis Ayre, Le Seuer, Minn	5 00
" H. R. Bigelow, Washington, D. C	5 00
" Thos. Lyon, Williamsport, Pa	5 00
" Silas W. Cox, Goldsboro, N. C	2 00
" W. W. Dale, Carlisle, Pa	2 00
" R. C. Hays, Shippensburg, Pa	1 00
" I. C. Brown, Columbus Junction, Ia	1 00
Total	$3,499 00

J. EWING MEARS, M.D.,
WILLIAM B. ATKINSON, M.D.,
Auditing Committee.

Philadelphia, October, 1892.

OFFICIAL LIST OF CHANGES in the Stations and Duties of Officers Serving in the Medical Department, U. S. Army, from November 19, 1892, to November 25, 1892.

First Lieut James D. Glennan, Asst. Surgeon U. S. A., is granted leave of absence for one month.

Major John C. G. Happersett, Surgeon U. S. A., is granted leave of absence for one month, on surgeon's certificate of disability, with permission to leave the limits of the department.

A board of officers, to consist of Col. Joseph R. Smith, Asst. Surgeon-General U. S. A.; Major David L. Huntington, Surgeon U. S. A.; Major Benjamin F. Pope, Surgeon U. S. A., is by direction of the President, appointed to meet at Whipple Bks., Ariz., on Monday, November 28, 1892, or as soon thereafter as practicable, for the examination of Capt. Louis M. Maus, Asst. Surgeon, with a view to determining his fitness for promotion, as contemplated by the Act of Congress approved October 1, 1890.

Capt. L. W. Crampton, Asst. Surgeon U. S. A., is granted leave of absence for one month, with permission to apply for an extension of three months.

Major Calvin De Witt, Surgeon U. S. A., is granted leave of absence for one month, with permission to apply to the proper authority for an extension of one month.

Capt. W. W. R. Fisher, Asst. Surgeon U. S. A., leave of absence for seven days granted is hereby extended fourteen days.